HITACHI

SC-OPE 3H
Instruction Manual

**Serial Communications /
Operator Interface
for Hitachi Inverters**





Manual Number: HAL1031

**After reading this manual,
keep it handy for future reference.**

Hitachi America, Ltd.
Tarrytown, NY, USA

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No.	Revision Comments	Date of Issue	Operation Manual No.
	Initial Release of SC-OPE 3H Instruction Manual	October 2001	HAL1031

Getting Started

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Introduction



The Hitachi Serial Communications Operator Interface, SC-OPE 3H, is an easy-to-use inverter operator panel. Its 4-line dot matrix display shows inverter status and works in conjunction with its keypad to provide inverter control and parameter editing capability.

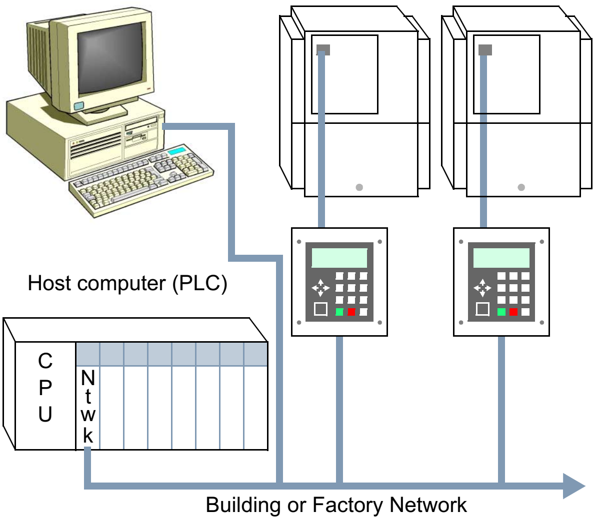
The SC-OPE 3H has various mounting options:

- Directly on the inverter (SJ300 / L300P)
- Panel-mounting with bezel/housing
- DIN-rail mounting inside panel

The SC-OPE 3H ("H" connotes *HVAC* version) provides a built-in network interface for connecting an inverter to popular building/factory networks, including:

- DirectNet
- Allen-Bradley DF1
- Modbus ASCII
- Modbus RTU
- Metasys N2

This manual includes specific examples for ModBus RTU and DirectNet connections with DirectLogic PLCs. See "Using Networks for Inverter Operation" on page 4–1.



__Note:__ The SC-OPE 3H network interface limits the J300 inverter to connecting to the Metasys N2 network only.

Conventions in this Manual

Paragraphs with special meanings are accompanied with a symbol in the margin. These include:



Note: *A Note calls attention to a detail that you may need to know to use the product feature being discussed.*



Tip: *A Tip suggests a way to apply the product that you may find helpful in your application.*



Caution: *A Caution message informs you of the potential of a minor hazard or an inconvenience in applying the product.*



Warning: *A Warning message informs you of the potential of bodily injury or equipment damage.*

Keypad Orientation

MONITOR

Monitor Mode displays important inverter data such as motor current in amperes or percent, torque in percent, and output frequency. You can program which monitor values are displayed. The Run command source and frequency setting source are also displayed. When the sources for Run command and Frequency Setting are set to be the SC-OPE keypad, you can use Monitor Mode to change the motor speed and run the motor.

QUICK MENU

The Quick Menu displays a short list of frequently used parameters. You can configure a SC-OPE to display the particular subset of parameters most often referenced or changed in your application.

PROGRAM

Program Mode provides access to edit the inverter's parameters. The parameters are organized into categories to provide a tree-like structure to access and edit parameter values.

CHANGE DATA

The Change Data function allows you to change the value of the inverter parameter currently displayed on the SC-OPE.

MODE

The Mode key allows navigation between the SC-OPE's normal modes or functions and Configuration Mode, used to configure the SC-OPE. Configuration Mode includes a data transfer utility that is used in communications with a PC. A configuration file stores the SC-OPE's network port settings, inverter family type, and other data.

READ / WRITE

The Read/Write Menu key accesses separate Read EEPROM Data or Write EEPROM Data operations, which move SC-OPE parameter settings to/from the inverter's EEPROM.

STORE / ENTER

After a Change Data operation, use the Store/Enter key to *store* the new value to the inverter's RAM. Pressing the Store/Enter key is required when you want to *enter* certain operational modes or sub-menu topics (denoted by the [Enter] prompt on the SC-OPE display).

ESC / CANCEL

The Esc/Cancel key provides a way to exit a menu item or cancel a pending data change operation.



The Help screen displays user-configurable text such as contact information for technical help or application assistance.



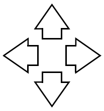
The Start/Run key sends the Run Fwd command to the inverter to run the motor. The inverter must be configured to use the keypad as the Run command source, quickly done by using the Hand/Auto key.



The Stop/Reset key will cause the inverter to stop the motor if it is running. When a trip condition exists, the Reset function will clear the trip condition for normal inverter operation (if the cause of the trip has been eliminated).



The Hand/Auto key provides a way to quickly change the Run command source (terminal strip or SC-OPE keypad), and to change the Frequency Setting source (terminal, potentiometer input, or keypad).



The Arrow keys provide a way to select menu functions or move the display cursor while editing parameters.

Warning: *The Stop/Reset key on the SC-OPE is not a substitute for an Emergency Stop push button. Always include a mechanical Emergency Stop switch within easy reach of an operator in your application.*

LED Indicators

The Power LED is ON whenever the SC-OPE has power. The inverter directly powers the SC-OPE in most applications, so the LED also indicates the presence of inverter input power.

The RUN LED is ON whenever a Run command is active (the actual output frequency > 0 and the motor is turning in either direction).

The Fault LED is ON whenever the inverter has recorded a trip event that has not been cleared.

Specifications

The SC-OPE 3H product features are outlined in the following table.

Item	Description
Inverter compatibility	Hitachi SJ100, L100, SJ300, L300P, J300
Display	LCD dot matrix, 20-character x 4-line display
Keypad	Membrane keys
Key functions	Monitor, Quick Menu, Program Mode, Change Data, Mode Change, Read/Write, Store/Enter, Esc/Cancel, Help Screen, Start/Run, Stop/Reset, Hand/Auto, Right Arrow, Left Arrow, Up Arrow, Down Arrow
LED indicators	Power LED, Run LED, Fault LED
Firmware	L100 / SJ100 families, or SJ300 / L300P families (download either firmware type)
Front connector	Modular RJ11, RS-232
Rear connector	Modular RJ45, SC-OPE-to-inverter connection only
Bottom connector	10-pin connector, RS–422 / RS–485 differential / external +5V power
Mounting options	1)Directly on inverter housing (SJ300 or L300P only) 2) Panel mount (use bezel kit); connect to inverter via cable 3) DIN rail mounting
Power consumption	+5V +/- 5% regulated, 200 mA maximum
Dimensions, mm (in.)	W = 112 (4.41), H = 131(5.16), D = 40 (1.58)
Bezel dimensions, mm (in.)	W = 161 (6.34), H = 187 (7.4), D = 38 (1.50)
Bezel mounting hole center locations, mm (in.)	Horizontal = 137 (5.39), Vertical = 135 (5.32)
Network port protocols *1	DirectNet, Allen-Bradley DF1, ModBus RTU, ModBus ASCII, MetasysN2
Network baud rates	300, 600, 1200, 2400, 4800, 9600, 19200
Network mode (electrical)	RS-232, RS-485 2-wire, RS-485 4-wire, RS-422 4-wire
Accessory kits	SC-OPE3BK (bezel kit), SC-OPE3CK (configuration kit)

*1 The communication protocols ModBus RTU, DirectNet, DF1, and Metasys N2 are discussed in Chapter 4, “Using Networks for Inverter Operation.”

Kit Product Components

SC-OPE3BK Bezel Kit The Bezel Kit includes parts for mounting the SC-OPE 3H to either a panel or DIN rail, and the cable required to connect the SC-OPE 3H to an inverter.

Quantity	Component Description for Bezel Kit
1	Bezel/housing for SC-OPE
1	Gasket (for seal between bezel/housing and control panel door)
1	O-ring (for seal between SC-OPE keypad and bezel/housing cutout)
1	Network Termination Board
1	Communication cable, 6’, connects SC-OPE to inverter
1	Connector plug (for RS-485 port connections and external +5V power)
4	Mounting screws for bezel/housing, 6-32 thread x 1 1/4”
4	Nuts for mounting screws, 6-32 thread
4	Lock washers for mounting screws, 6-32 size
2	Screws for back of bezel/housing (without DIN rail clips), 3-38 thread x 1”
2	DIN rail clips
2	Screws for back of bezel/housing (with DIN rail clips), 4-40 x 1 1/4”

SC-OPE3CK Configuration Kit The Configuration Kit includes software and communications cable for using a PC to manage SC-OPE settings and inverter parameter transfers. Use of the communication cable requires a cable adapter (included).

Quantity	Component Description for Configuration Kit
1	CD-ROM with Configuration Editor and firmware configuration files
1	Configuration cable, connects SC-OPE to PC, male RJ11 modular connector at both ends (use with adapter below)
1	Cable adapter, 9-pin D-shell female to RJ11 female modular

Frequently Asked Questions

Q. The inverter is already installed and running in my application (using the standard Hitachi keypad). How easy is it to install a SC-OPE 3H and resume control via its keypad?

A. It is easy to connect the SC-OPE and resume operation. See "Inverter Operation from the SC-OPE Keypad" on page 3–4.

Q. Will I be able to use the SC-OPE to initialize the inverter to restore factory default parameters?

A. Yes, for SJ300 and L300P inverters. See "Restoring Factory Default Inverter Settings" on page 3–32. Other inverters require using standard keypad sequences or input terminal signals as described in their instruction manuals.

Q. Can I use the SC-OPE 3H with inverters that do not have a front panel keypad bay for mounting operator interface devices?

A. Yes, but you will have to mount it remotely and use a communications cable to connect the SC-OPE to the inverter. Order the bezel kit SC-OPE3BK, which includes a bezel/housing and the necessary communications cable.

Q. Can I install or remove a SC-OPE 3H in an inverter while it is powered?

A. No — we recommend that you power off the inverter while installing or removing a SC-OPE from an inverter. This precaution applies to any connection on the rear connector of the SC-OPE. So, this includes connecting / disconnecting the SC-OPE to the inverter via an interface cable.

Q. Can I connect or disconnect the SC-OPE 3H to a PC while the inverter is powered?

A. Yes, the RS-232 connection to the PC is designed to connect or disconnect while powered.

Q. When using the SC-OPE with a connection to a PC, must I always have the SC-OPE connected to an inverter to get its power?

A. No, the SC-OPE's bottom connector (10-pin) will accept external +5V power from a supply you provide. Make sure it is regulated +5VDC power, +/- 5%. But in most situations, the SC-OPE will get its power from an inverter. Note that you must never connect the SC-OPE simultaneously to an inverter and another power source.

Q. Can I use the same SC-OPE hardware for SJ100, L100, SJ300, L300P, and J300 inverter series?

A. The same SC-OPE hardware is applicable to the above inverter series. The SC-OPE will mount in the keypad bay on the SJ300 / L300P series. The other inverter series require separate mounting of the SC-OPE (no keypad bay).

Q. Can I use the same SC-OPE firmware for the SJ100, L100, SJ300, L300P, and J300 inverter series?

A. It depends on the models involved. There are three unique firmware sets:
1) SJ100 / L100 firmware
2) SJ300 / L300P firmware
3) J300 firmware

You can change between any two inverters that share the same firmware by using only the SC-OPE keypad (for example, SJ00 and L100). To change between inverters that use different firmware sets requires downloading a new firmware set to the SC-OPE (see next question).

Q. Is is possible to download new firmware to the SC-OPE in the field?

A. Yes. You will need to order a SC-OPE3CK Configuration Kit, which is licensed for use on a single PC to be used as a configuration station. Of course, a single PC can configure as many SC-OPEs as you need (one at a time).

Q. Can I use a SC-OPE as a *Copy Unit*, that is — to copy parameters from one inverter to another?

A. Yes. You can connect or install the SC-OPE into the inverter you want to use as the source for parameter values. After reading the parameters to the SC-OPE EEPROM (retentive) memory, you can write the SC-OPE's memory contents to another inverter. See "Copying Parameters Between Inverters" on page 3–25.

Q. Can I use the Configuration Editor on a PC to store inverter parameters to a disk file?

A. No. A "configuration" file contains settings pertaining to the SC-OPE itself.

Q. My application will need to use the network port at the bottom edge of the SC-OPE. Can I still install the SC-OPE into the keypad bay of the inverter (SJ300 or L300P)?

A. No. The network port at the bottom edge of the SC-OPE uses a 10-pin plug connector. The inverter's keypad bay does not have room for the plug connector, network wiring, and network termination board (when required). Therefore, you will need to plan for either panel mounting or DIN-rail mounting the SC-OPE 3H in any networked application. The Bezel Kit SC-OPE3BK has the required accessories for mounting the SC-OPE 3H via either method.

Installation and Configuration

2

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Introduction

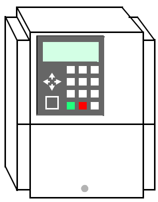
Mounting Options

Several mechanical mounting options for the SC-OPE are available. The proper option for your application depends on its requirements as described in the table below. Additional guidelines are on the following page.

Mounting Option	Application Description		
	Inverter Type	Use Network Port, RS-485	Use Network Port, RS-232
Mount to Inverter	SJ300 / L300P only	No	Yes
Panel Mounting	All inverters	Yes	Yes
DIN-rail Mounting	All inverters	Yes	Yes

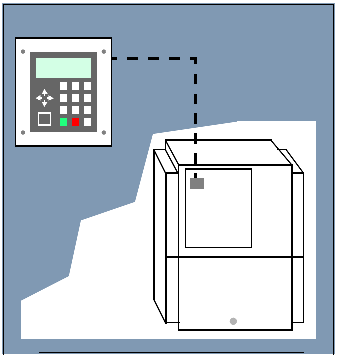
After the SC-OPE is mounted in the method appropriate for your application, be sure to read the remaining sections in this chapter, starting on page 2–15.

Mount to Inverter



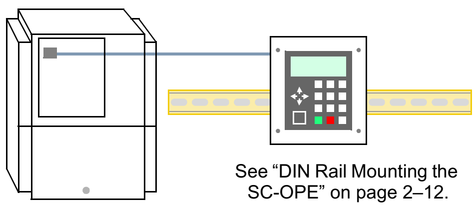
See “Mounting the SC-OPE to an Inverter” on page 2–5.

Panel Mounting



See “Panel Mounting the SC-OPE” on page 2–8.

DIN-rail Mounting



See “DIN Rail Mounting the SC-OPE” on page 2–12.

The guidelines for selecting the mounting options are:

- Only the SJ300 and L300P inverter families have the proper keypad bay to accept the SC-OPE for direct mounting. SJ100, L100, and J300 inverters will require remote mounting of the SC-OPE in all applications.

- If you want to use the SC-OPE's RS-485 network port, you must mount the SC-OPE separately from the inverter. This is to accommodate network cabling and a network termination board where applicable. Either the panel mount option or the DIN-rail option will work.

- If you only want to use the SC-OPE's RS-232 network port, any mounting option is permitted.

- If the inverter will be mounted in an enclosure (panel), we generally recommend panel-mounting the SC-OPE. This will provide easy operator access to the keypad, including access to the RS232 port for updating the SC-OPE configuration.

- The Bezel Kit contains the bezel/housing mounting hardware and the network accessories for using the RS-485 port. After performing the basic mechanical SC-OPE mounting you will be ready to make the network connection. See "Setting Up a Network Interface" on page 4–2.

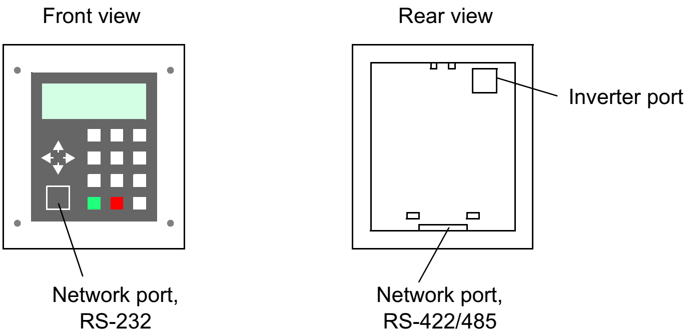
Caution: *Be sure to power OFF the inverter before performing wiring changes to the inverter or SC-OPE 3H, including connecting or disconnecting the SC-OPE from the inverter. Otherwise, erratic operation or damage to either unit may occur.*

Comm Port Introduction

The SC-OPE has two logical serial ports and three physical (connector) ports. Therefore, it is essential to understand the function and location of the SC-OPE serial ports.

- The *inverter port* is located at the top rear edge of the SC-OPE. It must be connected to a single inverter in every application. This serial port is dedicated to communicating with the inverter.

- The *network port* is logically one port, but it is available on two different connectors. The front modular RJ11 connector is an RS-232 network port. The bottom terminal strip connector is an RS-422/485 port. Since these two network ports are logically one port, only one of them may be in use at any time (or you may use neither of them).

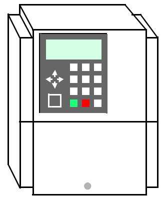


- The SC-OPE automatically detects a connection to a PC (running the Configuration Editor) on the RS-232 network port and communicates with it via a proprietary protocol. This *does not* rely on the current factory network configuration in the SC-OPE. Of course, do not attempt to communicate with the SC-OPE via the Configuration Editor and a factory network protocol at the same time.

Note: *The SC-OPE's RS-422/485 port cannot be used for communications to the PC Configuration Editor software. You can only use the RS-232 port.*

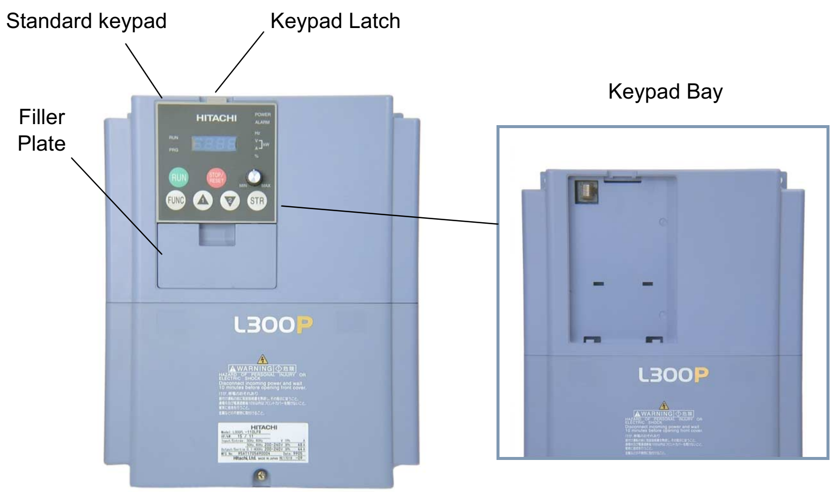
Mounting the SC-OPE to an Inverter

The SC-OPE 3H can be mounted directly to the inverter housings in the case of SJ300 and L300P families. This is ideal for stand-alone inverter applications (not on a factory network) or laboratory areas in which the inverter is not mounted in a panel enclosure. If the inverter is in a larger enclosure, note that mounting the SC-OPE to the inverter will require panel interior access to use the keypad.



To mount the SC-OPE to an inverter:

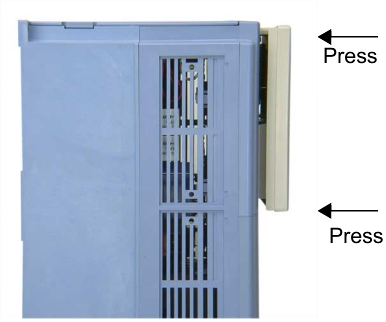
1 Remove the standard Hitachi keypad and panel filler plate. The keypad latch is located at its top edge. Press the keypad latch to release. Be sure to put the keypad and filler plate in a safe place in case they may be needed later.



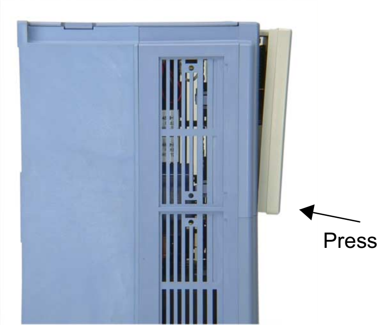
2 Clear the keypad bay of any dust and debris.

3 Remove the SC-OPE from its packing material. Take care not to touch any components on the circuit board to avoid potential static damage.

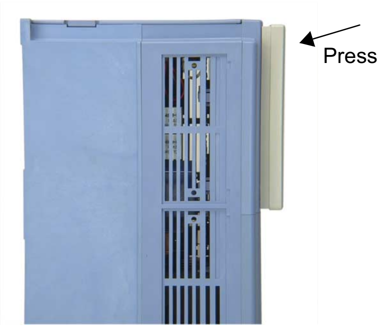
4 Slide the SC-OPE partially into the keypad bay as shown. As you do this step, keep the SC-OPE front keypad parallel to the inverter front panel. The goal of this step is to ensure the RJ45 interconnect in the inverter's keypad bay aligns with and is partially engaged with the top connector on the back of the SC-OPE. If this is not achieved, the interconnect will bind and make the next two steps impossible to perform.



5 Press along the SC-OPE bottom edge to engage the retention latches in the keypad bay. Do not allow the SC-OPE's top edge to slip out of the keypad bay during this step (would cause the RJ45 interconnect to mis-align).



6 Press along the top edge to complete the SC-OPE installation in the inverter.



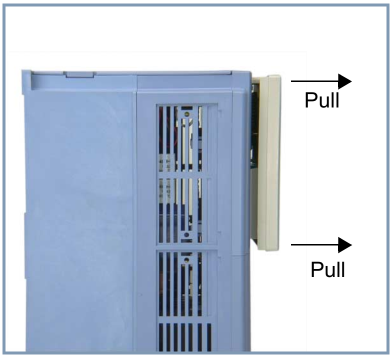
A proper installation will leave no gaps between the SC-OPE and the inverter front panel as shown below.



7 To remove the SC-OPE from the inverter, press the retention latch at the top on the SC-OPE housing. One technique is to grasp the SC-OPE at the bottom edge and use the thumb to press the retention latch as shown.



8 Disengage the bottom retention latches and remove the SC-OPE uniformly in order to avoid mechanical binding.



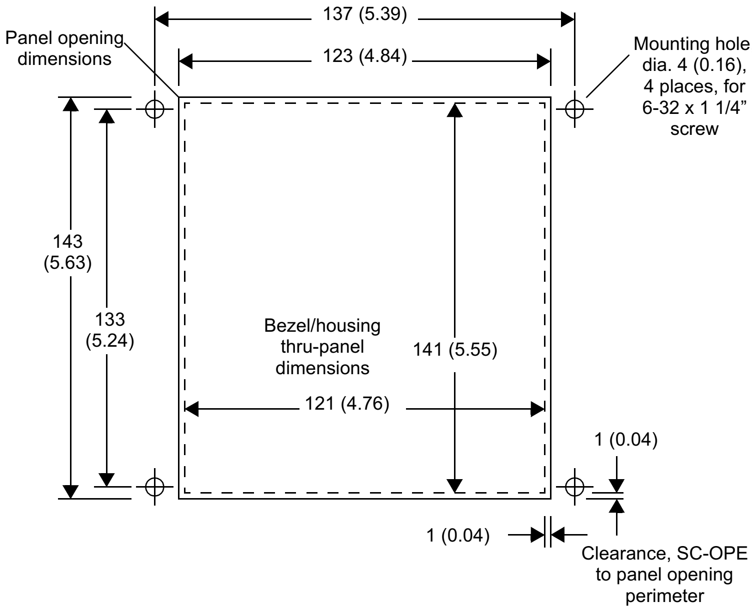
Panel Mounting the SC-OPE

The SC-OPE will be panel mounted in most applications. Panel mounting provides convenient operator access to inverter control while protecting the inverter inside an enclosure / control panel. Also, mounting the SC-OPE remotely from the inverter is required in network application to facilitate network wiring and termination. You will need a Bezel Kit to panel mount each SC-OPE device.

Tip: *We recommend initial mounting of the bezel/housing without the SC-OPE keypad. This protects the electrical components from dust, debris, and unnecessary handling until the bezel/housing installation is complete.*

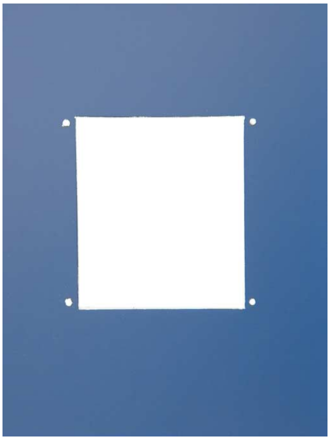
To mount the SC-OPE into a control panel or operator panel:

1 Use the dimensions in the diagram below to mark the cutting and drilling locations on the panel. Dimensions are in mm (inches) format.

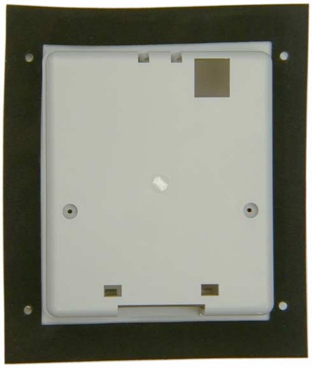


Note: *Be sure proper clearance behind the SC-OPE mounting location exists and that the cable from the inverter will be long enough to reach the mounting location.*

An example panel cutout is shown to the right. Be sure cutout lines are level and square with the control panel edges. Clean any debris from the edges and holes before proceeding.



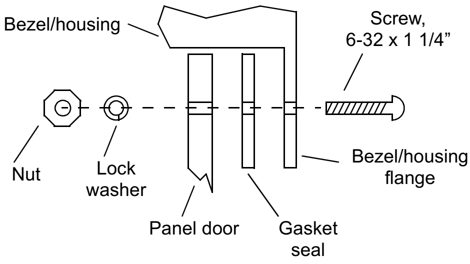
2 Place the gasket (included in the Bezel Kit) around the inside perimeter of the bezel/housing as shown. Align the holes in the gasket with the ones in the corners of the bezel/housing. This gasket provides a seal between the bezel/housing and the panel's front surface.





Tip: *We recommend installing only the bezel/housing into the panel at this point. The SC-OPE will be installed into the bezel/housing later in this procedure.*

3 From the front side of the bezel/housing, insert the four mounting screws through the housing and the gasket. This will serve to maintain alignment between gasket and housing for the next step.





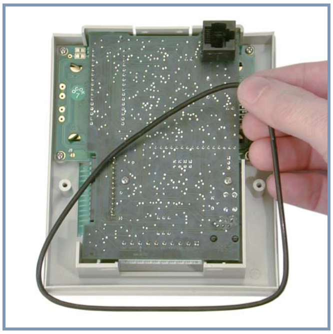
4 Now, take the bezel/housing and gasket assembly and insert it into the panel opening as shown.

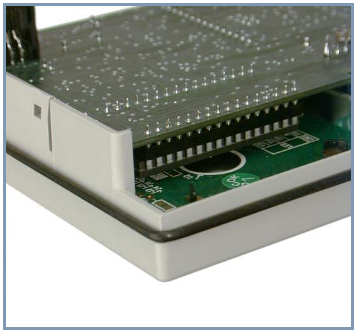


5 On the back of the panel, use the lock washers and nuts (provided in the Bezel Kit) to secure the bezel/housing to the panel.

6 Locate the O-ring seal in the Bezel Kit components and orient it as shown (below, left). The seal ensures a tight fit between the SC-OPE and the bezel/housing.

7 Carefully stretch the O-ring around the SC-OPE and situate it in the perimeter stepped channel as shown (below, right).





8 Take the SC-OPE and tilt it into the bezel/housing opening in the panel, latching the bottom edge first as shown (below, left). Then push the top of the SC-OPE keypad to engage the upper latch (below, right).





9 Secure the SC-OPE to the bezel/housing with the two 3-38 x 1” screws (included in the Bezel Kit).



To remove the SC-OPE from the bezel/housing (at a later time):

1 Unfasten the two screws on the back of the bezel/housing (below, left).

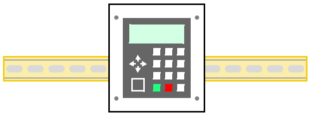
2 While ensuring the SC-OPE does not fall freely out of the bezel/housing, press gently on the modular connector from the rear of the unit as shown (below, right). This will unfasten the upper latch in the bezel/housing.





DIN Rail Mounting the SC-OPE

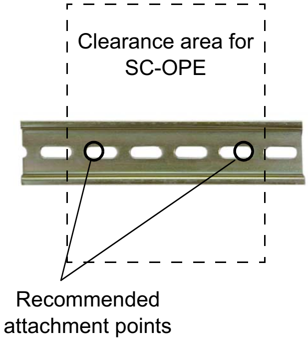
The SC-OPE can be mounted to a DIN rail as shown. This option is ideal for mounting in a panel when use of the keypad is primarily for service technicians rather than machine operators. The required bezel/housing and DIN rail clips are included in the Bezel Kit.



To mount the SC-OPE to a DIN rail:

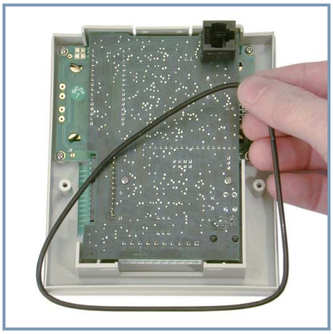
1 Secure the DIN rail to a solid surface.

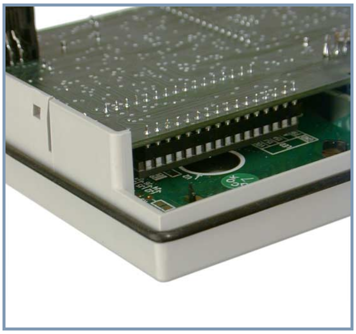
- Attach the DIN rail (fasteners not included) at the points shown to keep the DIN rail from twisting when installing/removing the SC-OPE.
- Ensure the space available has adequate clearance for the SC-OPE bezel/housing.
- Ensure keypad access will be suitable for a technician or operator.



2 Locate the O-ring seal in the Bezel Kit components and orient it as shown (below, left). The seal ensures a tight fit between the SC-OPE and the bezel/housing.

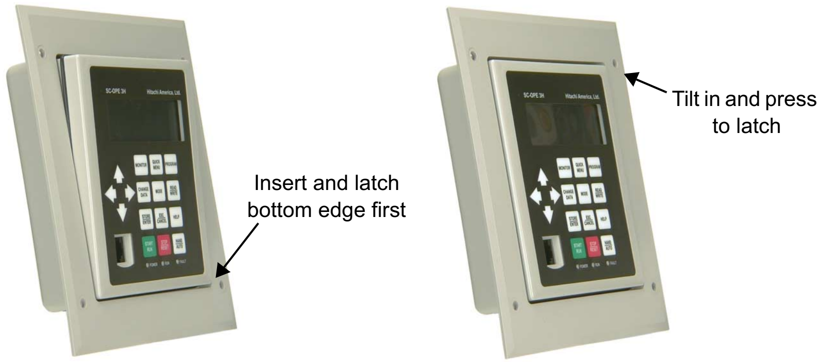
3 Carefully stretch the O-ring around the SC-OPE and situate it in the perimeter stepped channel as shown (below, right).



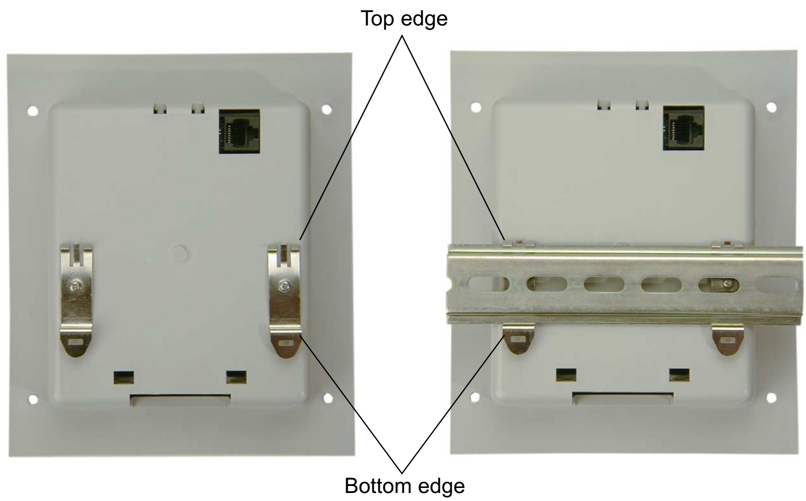


4 Insert the SC-OPE into the bezel/housing. You can use the square modular connector and corresponding opening to verify the orientation of the two parts. Begin with the SC-OPE bottom edge as shown (below, left), engaging the two internal latches at the bottom of the bezel/housing.

5 Tilt the top of the SC-OPE into the bezel/housing and latch (below, right).



6 Attach the two DIN rail clips using the two 1 1/4" x 4-40 screws included in the Bezel kit. Be sure to orient the clips with the hooked ends pointing upwards as shown (below, left). This will allow you to hang the SC-OPE from the top edge of a DIN rail and press against the rail to latch in the bottom edge as shown (below, right)



7 Mount the SC-OPE to the DIN rail. First, hang the tops of the DIN rail clips over the top edge of the rail. Then push inward on the lower part of the bezel/housing to latch the SC-OPE to the DIN rail.



8 Removal of the SC-OPE from the DIN rail is accomplished by pressing on the front top edge of the SC-OPE bezel/housing. This acts as a lever to unlatch the DIN rail clips at the bottom edge of the rail. This capability requires that the DIN rail be mounted securely to a solid surface as described in Step 1.

The next section shows how to connect the SC-OPE to the inverter.

Connecting the SC-OPE to an Inverter via a Cable

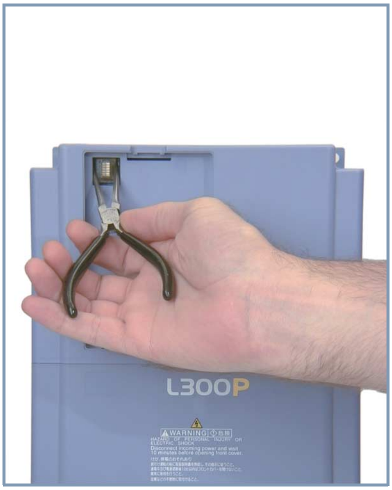
The panel mounting and DIN rail mounting options for SC-OPE installation require the use of a cable for SC-OPE-to-inverter communications. A cable is included in the Bezel Kit for this purpose.

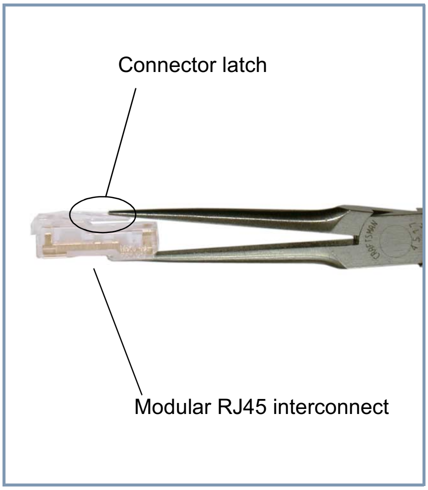
Note: *DIN-rail mounting the SC-OPE leaves a small clearance for the cable to exit. Standard modular connectors (such as Hitachi cable ICS-3) have an end connector too large to fit between the SC-OPE and the wall behind it when DIN-rail mounted. Be sure to use the cable supplied in the Bezel Kit.*

To connect the SC-OPE to an inverter via a cable:

1 Carefully remove the modular interconnect in the inverter's modular as shown. Be sure to grasp the latching prong such that it releases the connector for easy removal.

Caution: *DO NOT use excessive force to remove the modular interconnect. Otherwise, damage to inverter circuitry may occur.*





2 Plug the cable (included in the Bezel Kit) into the inverter's communication port (L300P shown below, left). The connector location for SJ100/L100 families is under the inverter housing.

3 Connect the other end of the cable to the SC-OPE as shown (below, right). If DIN rail mounted, you'll need to temporarily detach the SC-OPE assembly from the DIN rail for connector access.





Powering the SC-OPE via a Dedicated Supply

If you have already connected the SC-OPE to an inverter (described in the previous section), the SC-OPE will have the communications and power it needs to operate the inverter. In any of the mounting configurations and normal use, the SC-OPE gets its operating power from the inverter. However, it may be desirable in some situations to power the SC-OPE when an inverter is not available. For example, you could connect a PC to the SC-OPE and configure it (described later in this chapter). This section will show you how to power the SC-OPE using an alternate method.



Caution: *Do not connect the SC-OPE to an inverter and also connect a power supply to the SC-OPE at the same time. Otherwise, there is the danger of damaging the SC-OPE or the inverter circuitry.*

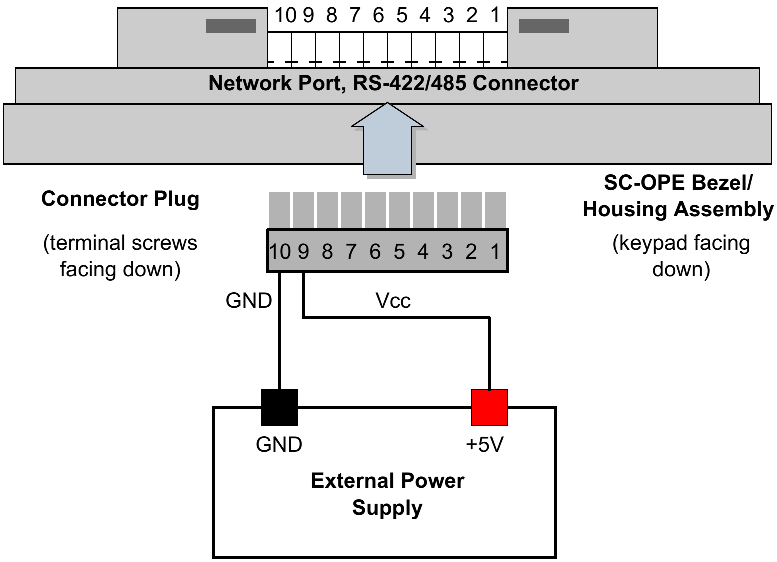
To connect an external supply to the SC-OPE:

1 Locate the 10-pin connector plug (supplied in the bezel kit).

2 Acquire a fully regulated 5VDC supply, +/– 5% (4.75V min. to 5.25V max.)

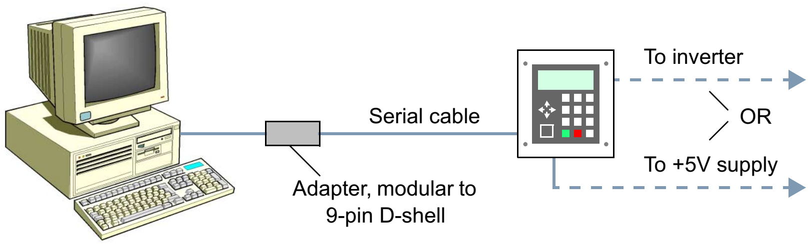
3 Connect the power supply to the 10-pin connector as shown below (GND to pin 10, +5V to pin 9).

4 Plug the connector into the network port of the SC-OPE.



Connecting the SC-OPE to a PC

The Configuration Kit includes a cable for connecting a PC to a SC-OPE. The typical connection will use a standard PC serial port, connecting it to the SC-OPE's front network port (RS-232).



To connect the SC-OPE to a PC:

1 Ensure the SC-OPE has a power source. In most applications it will be connected to the inverter (see page 2–15). Or, you may use an external power supply if an inverter is not available (see page 2–17). *Do not* use both power source connections at the same time.

2 Plug one RJ11 modular end of the cable into the cable adapter as shown.



3 Plug the other end of the cable into the SC-OPE's RS-232 port as shown.

4 You have two options in connecting the opposite cable end to a PC:

- For shorter distances, connect the adapter end of the cable directly to a 9-pin RS-232 port connector on the PC.
- For longer distances, connect a standard serial cable between the adapter and an RS-232 port connector on the PC.



Note: *The SC-OPE will communicate with its Configuration Editor in a PC via the RS-232 port. Do not attempt to use the Configuration Editor over a factory network.*

SC-OPE Configuration Editing

Introduction

The SC-OPE 3H contains firmware which enables it to communicate via a particular factory network protocol and with a particular inverter family. Additional settings configure the SC-OPE's Quick Menu, Startup Screen, and Help Screen. You may need to change the SC-OPE configuration from the factory defaults for your application.

The compatible inverter families are:

- SJ300 (factory default)
- L300P
- SJ100
- L100
- J300

The compatible factory networks are:

- DirectNet
- Allen-Bradley DF1
- ModBus RTU (factory default)
- ModBus ASCII
- Metasys N2

A SC-OPE configuration specifies an inverter family and a network protocol (along with associated baud rate, etc.) Even though each configuration contains a network selection, you may operate a SC-OPE and inverter without making any factory network connection.

Basic SC-OPE configuration settings may be edited with the SC-OPE keypad. The Configuration Editor (PC software) provides access to all configuration settings, and it can transfer configurations between the SC-OPE and PC.

Note: *A SC-OPE configuration does not contain inverter parameter settings. You can use the SC-OPE as a "copy unit" (upload parameters from one inverter and download them to another inverter). Since inverter parameters are not part of a SC-OPE configuration, a SC-OPE configuration file saved to disk does not store inverter parameters.*

Installing the Configuration Editor

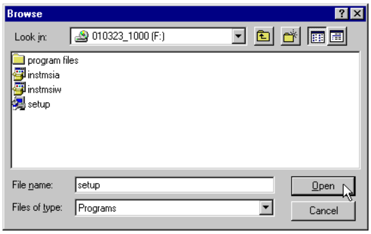
The Configuration Kit includes an installation CD-ROM, serial cable, and cable adapter. This is all you will need to connect a PC to the SC-OPE and edit the configuration.

To install the SC-OPE Configuration Editor software:

1 Insert the software installation CD into the CD-ROM drive in your PC. If the drive is configured to auto-run, the installation will automatically begin, and you can skip to step 7.

2 If the CD-ROM does not auto-run... From Windows' desktop, click Start > Run.

3 In the Run dialog, click Browse...

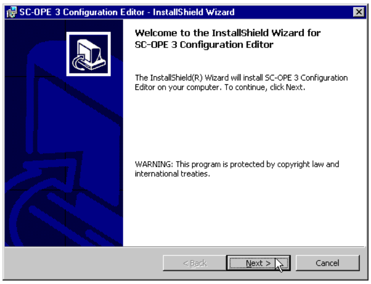


4 In the Browse dialog, navigate to the CD-ROM drive letter (typically D:) and click Open.

5 Click (select) the file "setup" and click Open.

6 In the Run dialog, the filename path "D:\Setup.exe" will appear in the Open field. Click OK.

7 Follow the on-screen instructions in the installation dialog boxes. You will have the choice of the install directory destination and program folder.



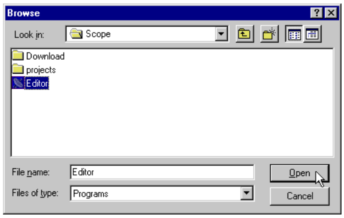
8 Click Finish when the installation is complete, and remove the CD-ROM from the drive.

(Optional) To create a desktop shortcut to the Configuration Editor:

1 On the desktop, right click and select New > Shortcut from the menu.

2 In the Create Shortcut dialog box, click Browse...

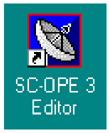
3 In the Browse dialog box, navigate to the installation directory. Example: C:\Program Files\Hitachi\Scope



4 Click (select) the Editor file and click Open.

5 In the Create Shortcut dialog box, click Next.

6 In the Select a Title for the Program dialog Box, enter a name such as “Scope 3 Editor.” and click Finish. The new shortcut will be on the desktop.



Uploading a Configuration

Using the Configuration Editor requires that you have performed basic setup tasks (per the procedures given in prior sections in this chapter).

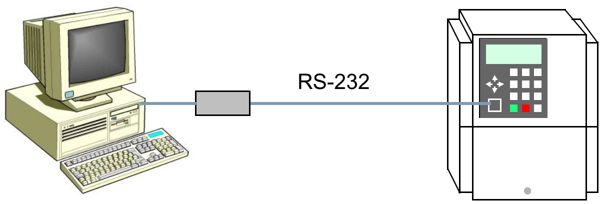
To prepare to edit a SC-OPE configuration:

1 Install the configuration software on the PC.

2 Connect the SC-OPE to the inverter (either through direct mounting or via the cable supplied in the Bezel Kit).

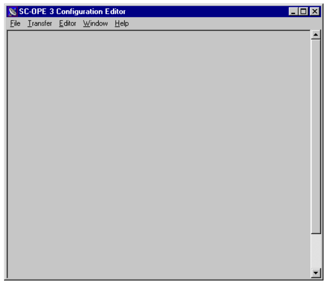
3 Connect the SC-OPE to an open serial port on your PC, using the cable supplied in the Configuration Kit.

PC with Configuration Editor

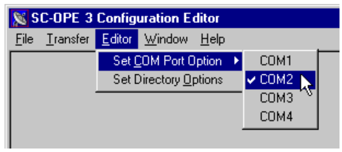


To upload a configuration from the SC-OPE to the PC:

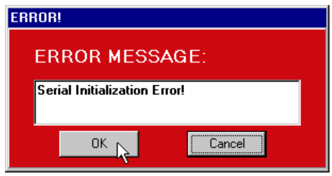
1 From Window's desktop, click Start > Programs > Hitachi > SC-OPE 3 Editor. Then the SC-OPE 3 Configuration Editor window will appear. Initially empty, the window area will eventually contain configuration window(s) when you have uploaded or created new ones.



2 Select the COM port which the editor will use to communicate with the SC-OPE. From the editor's menu, click Editor > Set COM Port Option > COM1 (or COM2, COM3, or COM4) as needed for your PC.



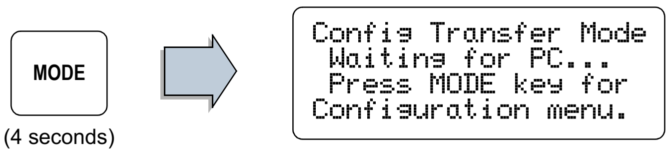
If you select a COM port which is already in use on your PC, an error message will appear. Click OK and repeat this step, selecting an available COM port.



3 Turn on power to the inverter, thus powering the SC-OPE. Ensure the motor (if connected) is not rotating at this time (press the Stop/Reset key if necessary).

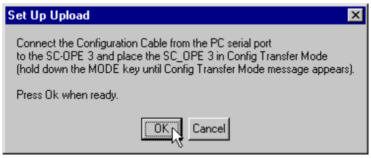
Note: *The SC-OPE can only communicate with an inverter of the type specified in its configuration. If your SC-OPE is connected to a different type of inverter, the SC-OPE will not power up to normal operation. However, you can still re-configure the SC-OPE for proper operation by following this procedure.*

4 Press the Mode key for 4 seconds to place the SC-OPE in Configuration Transfer Mode. This mode permits you to transfer SC-OPE configurations to/from the PC.

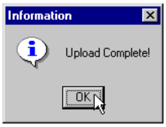


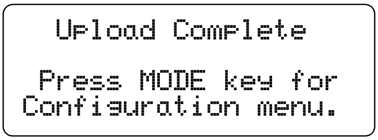
Note: *More information on SC-OPE operating modes is in Chapter 3. This section covers only the essential mode changes for configuration tasks.*

5 From the Configuration Editor's menu, click Transfer > Upload Configuration. A dialog box appears which reminds you to do the setup tasks covered in the steps above. Click OK.



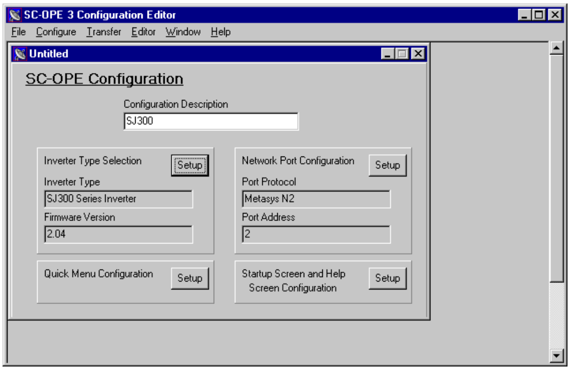
At this point the Editor will attempt to communicate with the SC-OPE and upload its current configuration to the PC. If the upload is successful, you'll see the confirming messages below.





If the upload is *not* successful, correct the problem (such as serial cable connection incorrect, etc.) and repeat the above steps.

6 Click OK in the Information dialog box and the Configuration Editor will display the uploaded configuration in its own window, displaying primary information in the fields as shown. Each settings group can be edited with the corresponding Setup button. The next several sections discuss editing individual configuration setups.



Inverter Type Configuration

The SC-OPE firmware contains the software that enables it to communicate with an inverter. Three unique firmware sets provide SC-OPE communication capability:

1. SJ100 / L100 firmware
2. SJ300 / L300P firmware
3. J300 firmware

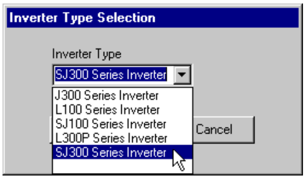
When you use the Configuration Editor to configure the inverter type, a Download Configuration operation will automatically load the appropriate firmware to the SC-OPE. In the cases of 1) and 2) above, you can change between the two corresponding inverter types that share the same firmware by using only the SC-OPE keypad (for example, SJ00 and L100). This provides some flexibility without having to use the Configuration Editor in every inverter type change. A change of firmware *always* requires the use of the Configuration Editor, however. When staying within the same firmware type, you can use the SC-OPE keypad for convenience.

This section shows both methods for configuring inverter type.

To change the inverter type selection by using the Configuration Editor:

1 In the Inverter type Selection group, click the Setup button.

2 In the Inverter Type Selection dialog box, use the pull-down menu to select the inverter type you want the SC-OPE to target for communications.





***Note:** You can configure the SC-OPE for an inverter type belonging to a different firmware set than the type of inverter currently connected to the SC-OPE. However, remember that SC-OPE operation will be restricted to Configuration Mode until its firmware matches the type of inverter which is actually connected. In that case, the SC-OPE will power up and only display the Startup Screen. Press the Mode key for 4 seconds to enter Config Transfer Mode.*

To change the inverter type selection by using the SC-OPE keypad:

1 Press the Mode key for 4 seconds to place the SC-OPE in Configuration Transfer Mode.

MODE (4 seconds)

```
Config Transfer Mode
 Waiting for PC...
 Press MODE key for
Configuration menu.
```

2 Press the Mode key again (briefly) to get the Configuration Menu. The Inverter Port Cfg item at the top of the menu list determines the inverter type selection.

MODE

```
 Configuration Menu

Inverter Port Cfg
>>
```

3 Press the Right Arrow key to view the Inverter Port Cfg sub-menu which consists of one item: Inverter Type.

```
 Configuration Menu

Inverter Type
 SJ300 Series
```

4 Press the Change Data key. The “>” and “<” characters indicate that Change Data is active.

CHANGE DATA

```
 Configuration Menu

Inverter Type
>SJ300 Series<
```

5 Press the Up Arrow or Down Arrow keys as needed to select the new type. Remember that only the inverter type which shares the current firmware in the SC-OPE can connect (using this method).

```
 Configuration Menu

Inverter Type
>L300 Series<
```

6 Press Store/Enter to accept the new inverter type.

STORE ENTER

```
 Configuration Menu

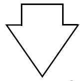
Inverter Type
 L300 Series
```

7 Press the Left Arrow key to exit the Inverter Type sub-menu.

```
 Configuration Menu

Inverter Port Cfg
>>
```

8 Press the Down Arrow key twice to access the Store Configuration Menu Item.


Press twice

```
 Configuration Menu

Store Configuration
[Enter]
```

9 Press the Store/Enter key to store the configuration change.




```
 Configuration Menu

Store Configuration
Configuration Stored
```


Network Port Configuration

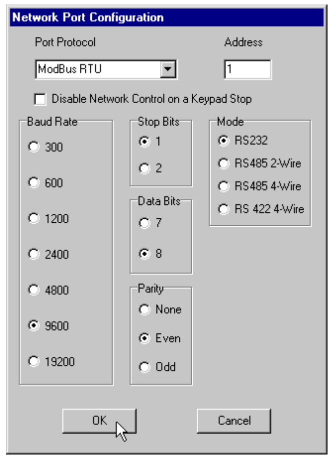
Network port configuration is only necessary when connecting the SC-OPE to a factory network. SC-OPE communications to the Configuration Editor is automatic (does not require network port configuration). This section shows how to configure the network port using the Configuration Editor or using the SC-OPE keypad.

To configure the network port by using the Configuration Editor:

1 In the Network Port Configuration group, click the Setup button. The Network Port dialog box will appear.

2 In the Port Protocol field, click the desired factory network protocol in the list.

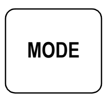
3 Please refer to Chapter 4 for a complete discussion on the remainder of the settings and the related wiring diagrams, network termination considerations, etc.



Note: *The configuration edits do not affect the SC-OPE until you download the new configuration to the SC-OPE.*

To configure the network port by using the SC-OPE keypad:

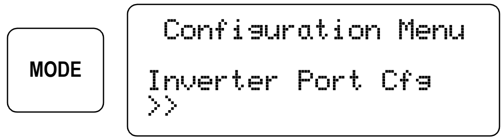
1 Press the Mode key for 4 seconds to place the SC-OPE in Configuration Transfer Mode.



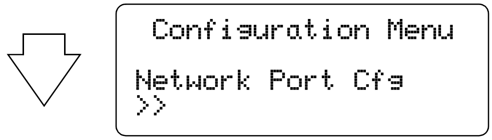
(4 seconds)

```
Config Transfer Mode
 Waiting for PC...
 Press MODE key for
Configuration menu.
```

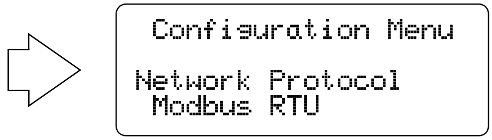
2 Press the Mode key again (briefly) to get the Configuration Menu.



3 Press the Down Arrow key once to view the second list item, Network Port Cfg.



4 Press the Right Arrow key to view the Network Port Cfg sub-menu list.

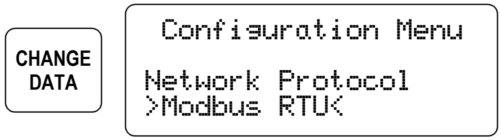


5 Access the desired network port attribute item by using the Up and Down arrow keys.

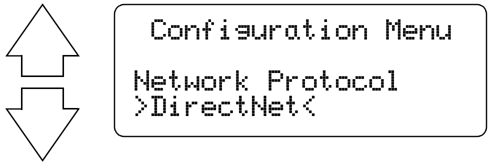
The list includes:

- Network Protocol (factory network)
- Network Address (node address 1 to 255)
- Network Port Type (RS-232, RS-485 2-wire, RS-485 4-wire, RS-422 4-wire)
- Network Config (baud rate)
- Network Config (data bits)
- Network Config (parity)
- Network Config (Stop bits)
- Network Config (Flow control)
- Network Config (RTS delay)
- Network Port Mode (master/slave)
- Network Max Gap Time
- Stop Key Action (enables or disables keypad Stop key during network control)

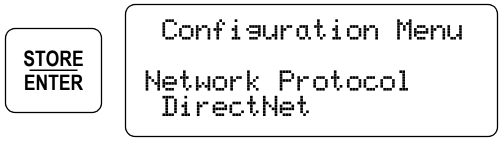
6 Press the Change Data key to begin editing a setting.



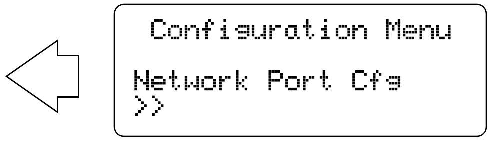
7 Use the Up and Down Arrow keys to change the setting selection.



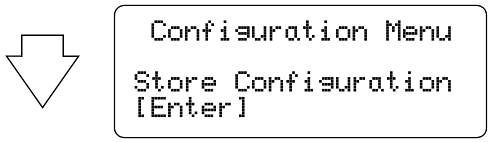
8 Press the Store/Enter key to accept the new setting.



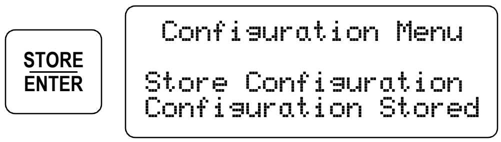
9 Press the Left Arrow key to exit the Network Port Cfg sub-menu.



10 Press the Down Arrow key once to access the Store Configuration menu item.



11 Press the Store/Enter key to store the configuration change.

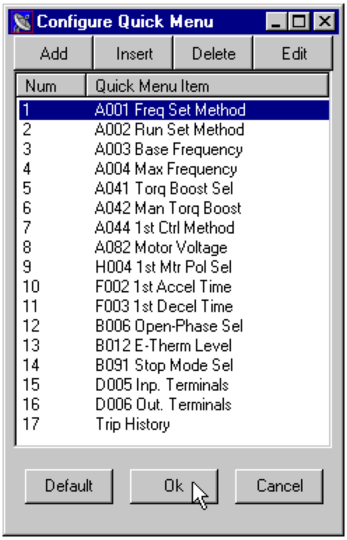


Quick Menu Configuration

The SC-OPE's Quick Menu presents a subset of the inverter parameters for monitoring or editing via the keypad in normal operation. The single key Quick Menu provides fast access to a circular list of up to 32 items. The factory default Quick Menu can be edited with the Configuration Editor to provide a custom menu for specific applications or market segments. For example, a Quick Menu which is optimized for HVAC applications will be different from a menu optimized for a pumping station.

To configure the Quick Menu:

1 In the Quick Menu Configuration group, click the Setup button. The Configure Quick Menu dialog box will appear as shown. The list of parameters is the current Quick Menu in the SC-OPE.



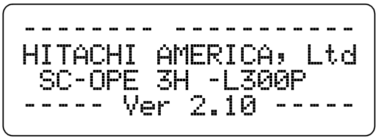
2 Use the buttons at the top of the Configure Quick Menu dialog box to change the list:

- **Add** – Click Add to add a new item to the bottom of the menu list. Select the new parameter from the pop-up menu and click OK.
- **Insert** – Click Insert to insert a new item just above the currently selected item in the menu list. Select the parameter from the pop-up menu and click OK.
- **Delete** – Click Delete to delete the currently selected item in the menu list.
- **Edit** – Click Edit to replace the currently selected item in the menu list. Select the new parameter from the pop-up menu and click OK.
- **Default** – Click Default to restore the factory default list.
- **Cancel** – Click Cancel to discard edit(s) to the Quick Menu Configuration in the Editor.
- **OK** – Click OK to apply the changes (Add, Insert, Delete, Edit, Default) to the configuration.

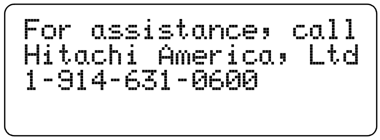
***Note:** The configuration edits do not affect the SC-OPE until you download the new configuration to the SC-OPE.*

Startup Screen and Help Screen Configuration

The SC-OPE features two user-configurable information screens. The *Startup Screen* is displayed momentarily at powerup. The *Help Screen* is displayed (during normal operation) when you press the Help key on the keypad. These configurable screens are suited for editing by OEMs for their specific application areas.

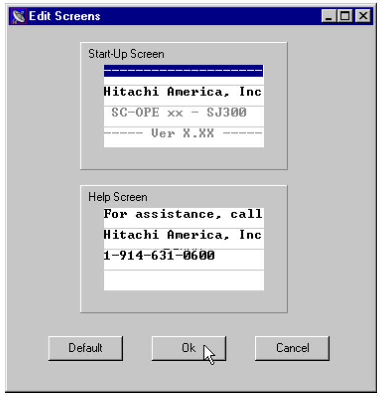


Startup screen (default)



Help Screen (default)

To edit the content of the Startup and Help Screens:



1 In the Startup Screen and Help Screen Configuration group, click the Setup button. The Edit Screens dialog box will appear.

2 To edit a line in the screens, click the cursor in the appropriate field and enter (or edit) the existing content.

Note: *The bottom two lines of the Startup Screen have fixed content and cannot be edited.*

3 Click Default to restore the screens to display the factory default content as shown above.

4 Click OK when you have completed the screen content edits.

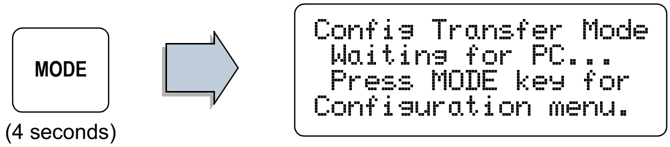
Note: *The configuration edits do not affect the SC-OPE until you download the new configuration to the SC-OPE.*

Downloading a Configuration

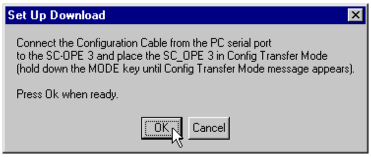
The previous sections describe how to upload and edit a configuration. To actually update the SC-OPE's firmware, you must download the new configuration from the PC to the SC-OPE.

To download a configuration from the Editor:

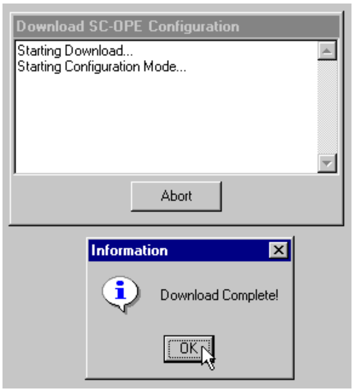
1 Ensure the SC-OPE is in Config Transfer Mode (will display screen as shown below). If necessary, press the Mode key for 4 seconds to place the SC-OPE in Configuration Transfer Mode.



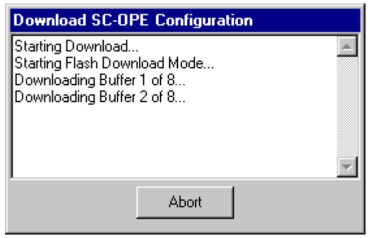
2 From the Configuration Editor, click Transfer > Download Configuration. A dialog box appears which reminds you of transfer setup details. Click OK.

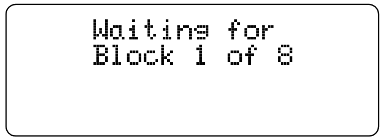


3 The Download SC-OPE Configuration windows shows the transfer progress. When complete, click OK.
(continued next page)



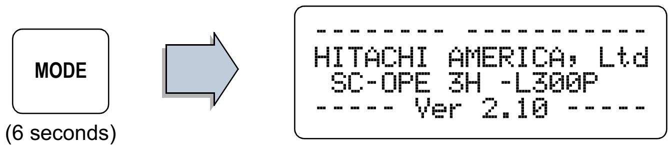
When you have changed the inverter type in a configuration (such as from “L100” to “SJ100”), a configuration download includes inverter-specific firmware for the SC-OPE. The status message “Starting Flash Download Mode” followed by “Buffer 1 of 8” etc. indicates the new inverter-specific firmware is downloading. The SC-OPE shows the buffer (block) number which is currently loading.





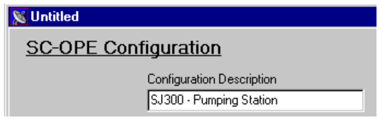
Note: *Configuration uploads do not include inverter-specific firmware. The Editor installation already contains all inverter-specific firmware files in its subdirectory named “Download.”*

4 After downloading the configuration you may want to return the SC-OPE to normal operation from Configuration Mode. Press the Mode key for 6 seconds as shown.



Naming / Saving Configurations

The editor has the capability to save SC-OPE configurations to disk in your PC. Each configuration will have a unique file-name. Before saving a configuration, you can enter a text Configuration Description in the field provided as shown.



To save a configuration to disk:

1 From the Configuration Editor menu, click File > Save.

2 In the Save As dialog box, navigate to the desired directory, enter the filename, and click Save. Each configuration uses the “*.prj” filename format.

Editor Options

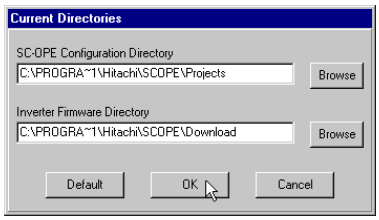
The Configuration Editor has options you can set based on your PC hardware and your preferences.

To select the COM port:

- From the Configuration Editor menu, click Editor > Set COM Port Option > COM1 (use available COM port on your PC).

To set the directory options:

1 From the Configuration Editor menu, click Editor > Set Directory Options. The Current Directories dialog box will appear as shown.



2 The SC-OPE Configuration Directory is the default directory the Editor uses when you click File > Save. Click Browse to nav-igate to the directory of your choice.

3 The Inverter Firmware Directory is the directory within the Editor installation on your PC which contains SC-OPE firmware versions specific to inverter families. Change this directory ONLY if you have obtained SC-OPE firmware files and located them in a directory different from the default installation directory.

4 Click Default if you want to restore the directory paths to the original ones in the Editor installation.

5 Click OK to save the options for the Editor.

Printing a Configuration

You can print the settings which comprise a configuration. This feature is handy for creating project documentation.

To print a configuration:

1 From the Configuration Editor menu, click File > Print.

2 In the Print dialog box, change any settings as needed and click OK.

Viewing Multiple Configurations

In applications using multiple SC-OPE devices and configurations, you may have multiple configurations open in the Configuration Editor. Each open configuration file will have its own window.

To manage multiple configuration file windows in the Configuration Editor:

1 From the Configuration Editor menu, click Window > Tile, or Window > Cascade, or Window > Arrange icons to display the configuration windows in corresponding fashion.

2 You can restore any minimized configuration window to bring it to the front. From the Configuration Editor menu, click Window > <windowname>, where the numbered list contains the configuration window names.

Using the Keypad for Inverter Operation

3

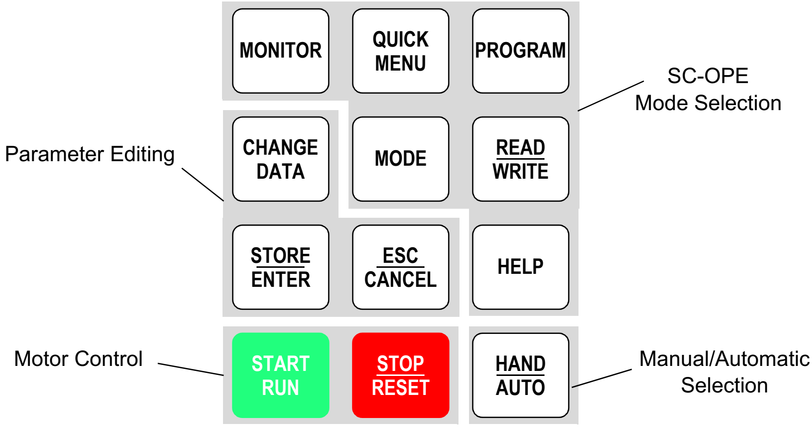
In This Chapter. . . . page

- Orientation to Using the SC-OPE 2
- Inverter Operation from the SC-OPE Keypad 4
- Program Mode 11
- SC-OPE and Inverter Memory Resources 17
- Quick Menu Operation 19
- Copying Parameters Between Inverters. 25
- Monitor Mode 27
- Restoring Factory Default Inverter Settings 32

Orientation to Using the SC-OPE

Using the Keypad

The SC-OPE 3H keypad provides direct access to inverter control and programming of parameters. The keypad layout arrangement shown below groups the keys into functional groups — keys that perform similar or related functions.



SC-OPE Mode Selection The SC-OPE 3H has operational modes which are independent of the attached inverter's modes. These include Monitor Mode, Program Mode, Quick Menu, Read/Write Menu, and Help. The five corresponding keys provide immediate access to the respective mode; you can jump from any of the modes to another with a single key press. Powerup of the SC-OPE always enters Monitor Mode. The Mode key performs a fundamental role in mode selection by switching the SC-OPE from its five normal modes to Configuration Mode and back to normal operation (to Monitor Mode).

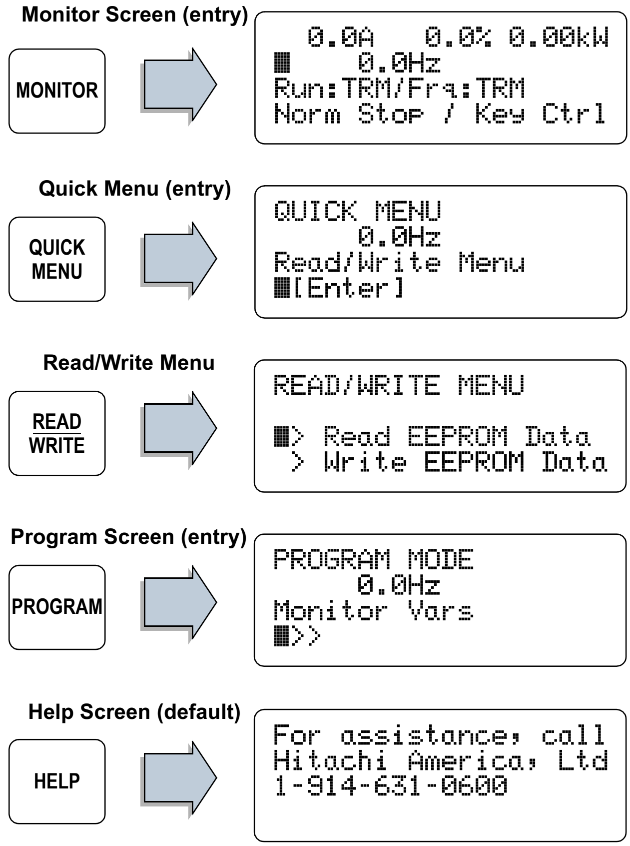
Manual/Automatic Selection The Hand/Auto key allows the operator to select the source device for the Start Run Command and the inverter frequency setting. Successive Hand/Auto key presses sequence through a fixed set of selections. Source devices include the SC-OPE keypad and the inverter input terminals.

Parameter Editing The Change Data key, Store/Enter Key, and Esc/Cancel key work together to change inverter settings. When using these keys in Program Mode, you can change inverter parameter values. When used in Monitor Mode, you can change the output frequency (controls motor speed) of the inverter.

Motor Control The Start Run and Stop/Reset keys provide direct control over the inverter's output. These work independently of the SC-OPE's five normal modes. However, you cannot run the motor when in Configuration Mode.

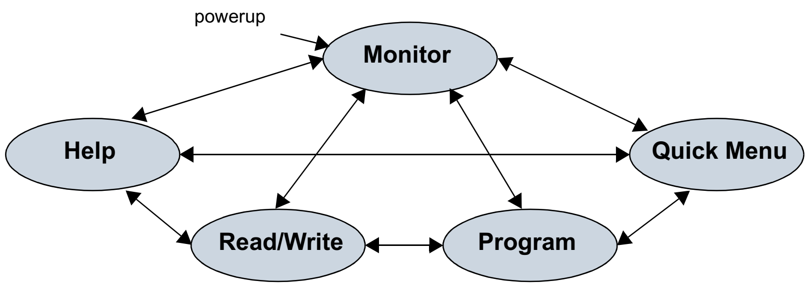
SC-OPE Normal Operating Modes

The SC-OPE 3H normal operational modes feature unique display output fields. Press the corresponding key to view the default or mode entry screen contents.



The diagram to the right shows the organization of the SC-OPE's operating modes. The line and arrows indicate that you can switch from any mode to any other mode.

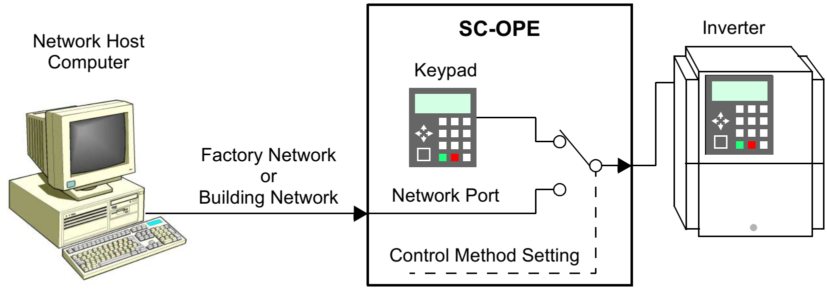
SC-OPE Modes in Normal Operation



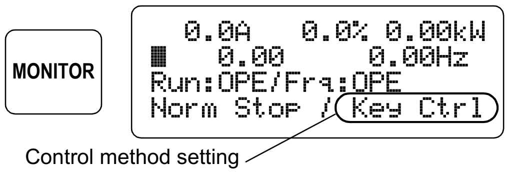
Inverter Operation from the SC-OPE Keypad

Selecting Keypad or Network Control

An operator can run and program the inverter from the SC-OPE keypad. To achieve unattended operation, the operator can configure the SC-OPE to send factory network commands it receives on to the inverter. These can also run and program the inverter. During network control, the SC-OPE's keypad will be prevented from editing parameters or running the motor in order to avoid a conflict with network host commands. The diagram below illustrates control via keypad or network.

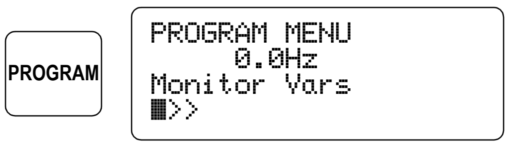


The SC-OPE's control method setting is fundamental and very important to know. Its default setting is "Keypad Control," displayed in Monitor Mode in the corner of the display. It is not necessary to change this setting unless you have a factory network connection and want the network host to control the inverter.

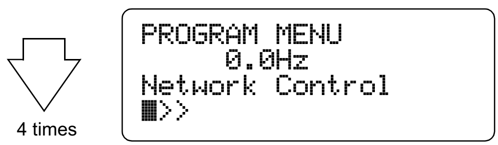


To change the Control Method setting:

1 Press the Program key to enter Program Mode.



2 Press the Down Arrow key four times to arrive at the Network Control menu item.



3 Press the Right Arrow key to access the first item on the Network Control menu: Control Method.

```
PROGRAM MENU
     0.0Hz
Control Method
█Keypad
```

4 Press the Change Data key. The “>” and “<” characters indicate Change Data is active.

CHANGE DATA

```
PROGRAM MENU
     0.0Hz
Control Method
>Keypad<
```

5 Press the Down Arrow key to select Network, or the Up Arrow key to select Keypad (see note below).

```
PROGRAM MENU
     0.0Hz
Control Method
>Network<
```

Note: *For the purpose of following the discussion in this chapter, leave the Control Method setting at “Keypad.” If you want a network host to control the inverter, set Control Method to “Network” and refer to Chapter 4 for network control material.*

6 Press Store/Enter to accept the new selection, or Esc/Cancel to abort the edit.

```
PROGRAM MENU
     0.0Hz
Control Method
█Keypad
```

7 Press the Monitor Key to return to the default powerup mode of the SC-OPE. The Control Method setting will be displayed in the corner of the display.

MONITOR

```
  0.0A    0.0% 0.00kW
█   0.00      0.00Hz
Run:OPE/Frq:OPE
Norm Stop / Net Ctrl
```

Control method setting

Choosing the Direction of Rotation

The SC-OPE 3H has a Run Start key for operator-initiated rotation of the motor. Pressing the Start Run key causes the SC-OPE to send a Run FWD command to the inverter. Initiating a Run Rev command is not available from the SC-OPE 3H keypad; HVAC and pump applications generally require one direction of rotation. However, using the SC-OPE, you can program the inverter for either forward or reverse rotation in response to the Run FWD command (Start Run key action). Inverter parameter F004, keypad Run Key Routing, can be set to FWD or REV in the inverter. This setting does not affect the inverter's response to run commands from other sources, such as intelligent inputs or network commands.

Caution: *In HVAC and pump applications, the motor is generally restricted to operate in one direction only. If your SC-OPE is already integrated into a control system by an OEM, changing the sense of direction for the Start Run key may damage equipment run by the control system.*

To configure the inverter direction via the Run key routing setting:

1 Press the Program Mode key to enter Program Mode.

PROGRAM

```
PROGRAM MENU
     0.0Hz
Monitor Vars
▮>>
```

2 Press the Down Arrow key to reach the Parameters menu item.

```
PROGRAM MENU
     0.0Hz
Parameters
▮>>
```

3 Press the Right Arrow key to enter the Parameters sub-menu list.

```
PROGRAM MENU
     0.0Hz
Initial
▮>>
```

4 Press the Down Arrow key several times until you reach the Operation menu item.

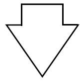
several times

```
PROGRAM MENU
     0.0Hz
Operation
▮>>
```

5 Press the Right Arrow key to enter the Operation sub-menu list.

```
PROGRAM MENU
     0.0Hz
A085 Oper Mode Sel
▮NOR
```

6 Press the Down Arrow key several times to access the Run Key Routing menu item.



several times

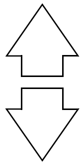
```
PROGRAM MENU
     0.0Hz
F004 Run Key Routing
■FWD
```

7 Press the Change Data key to enable the Change Data function.

CHANGE DATA

```
PROGRAM MENU
     0.0Hz
F004 Run Key Routing
>FWD<
```

8 Use the Up Arrow and Down Arrow keys to change the setting. REV and FWD are the available settings.



```
PROGRAM MENU
     0.0Hz
B035 Dir. Restrict
>REV<
```

9 Press the Store/Enter key to accept the entry.

STORE ENTER

```
PROGRAM MENU
     0.0Hz
B035 Dir. Restrict
■REV
```

10Press the Monitor Mode key. The display will prompt you to save the change made in Program Mode to the inverter's EEPROM.

MONITOR

```
Inverter Paramerers
 have been changed.
  Store to EEPROM?
   STORE / CANCEL
```

11 Press the Store/Enter key to save the parameter change to the inverter's retentive memory (EEPROM).

STORE ENTER

```
Inverter Paramerers
 have been changed.
  Store to EEPROM?
 ** Storing Data **
```

12 Press the Start Run key to run the motor. The display shows the newly selected direction of rotation per the Run Key Routing parameter setting.

START RUN

```
  0.0A   0.0% 0.00kW
■  10.00     0.00Hz
Run:OPE/Frq:OPE  REV
Ramp Up   / Key Ctrl
```

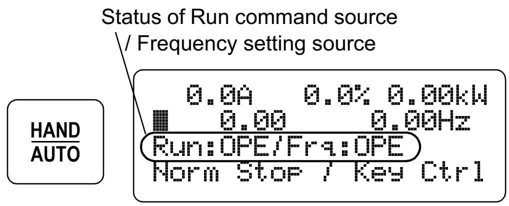
Motor Control from the SC-OPE

Operating the inverter and motor requires proper parameter setup. If you have a new application, it may be easiest to begin with the default parameters. Refer to the inverter instruction manual and follow the Powerup Test given in the Installation and Wiring Chapter.

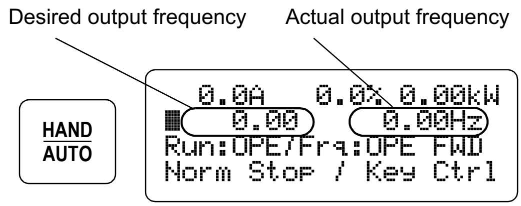
To run the inverter from the SC-OPE keypad:

1 Press the Monitor Mode key to enter Monitor Mode.

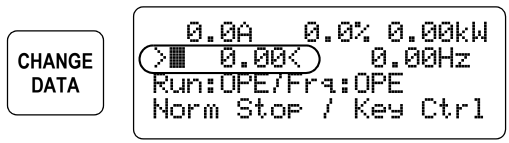
2 Press the Hand/Auto key successively until the Run and Freq. Source settings are both set to “OPE” as shown to the right. This means the operator interface (SC-OPE) is selected to generate Run FWD and Run REV commands and to generate the basic inverter speed setting (parameter F001). Leave the SC-OPE display in Monitor Mode.



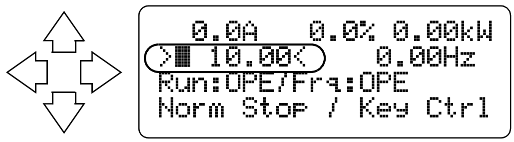
In Monitor mode, the second line displays the desired and actual frequencies. You can edit the desired frequency in Monitor Mode, setting parameter F001 (Frequency Setting) in the inverter.



3 Press the Change Data key to edit the desired inverter frequency setting. The “>” and “<” characters indicate Change Data is active.

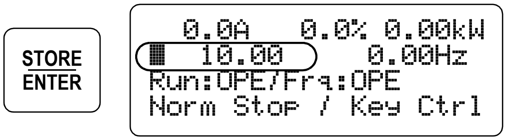


4 Use Right and Left Arrow keys to move the cursor to the digit you want to change. Then use the Up and Down Arrow keys to increment or decrement the digit. This example uses 10Hz. We recommend using a relatively slow initial speed.

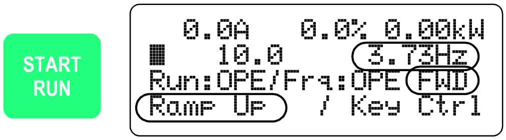


***Caution:** Before running the motor, ensure the mechanical load can move freely from obstructions and personnel. Otherwise, damage to equipment or injury to personnel may occur.*

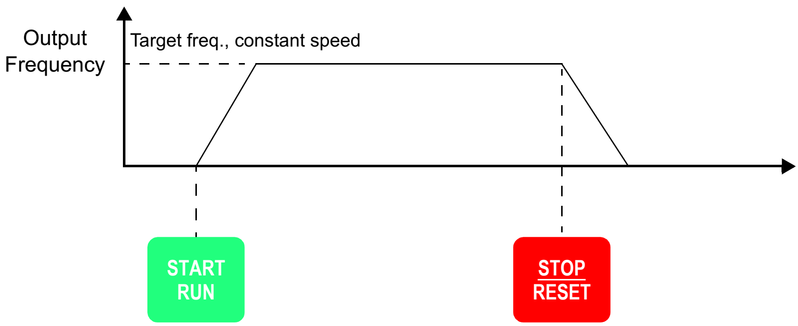
5 Press the Store/Enter key to accept the new desired frequency.



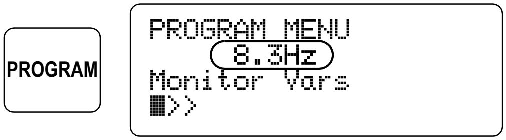
6 Press the Start Run key. The RUN LED should turn ON to indicate the inverter is in Run Mode. The monitor screen will indicate the actual frequency, motor direction and status such as "Ramp Up," "Const Spd," "Ramp Down," and "Norm Stop."



7 Press the Stop/Reset key. The example motor profile below shows the keypad command of motor operation. The Up Arrow and Down Arrow keys adjust the motor speed (when the inverter frequency source is configured as the operator keypad — SC-OPE).



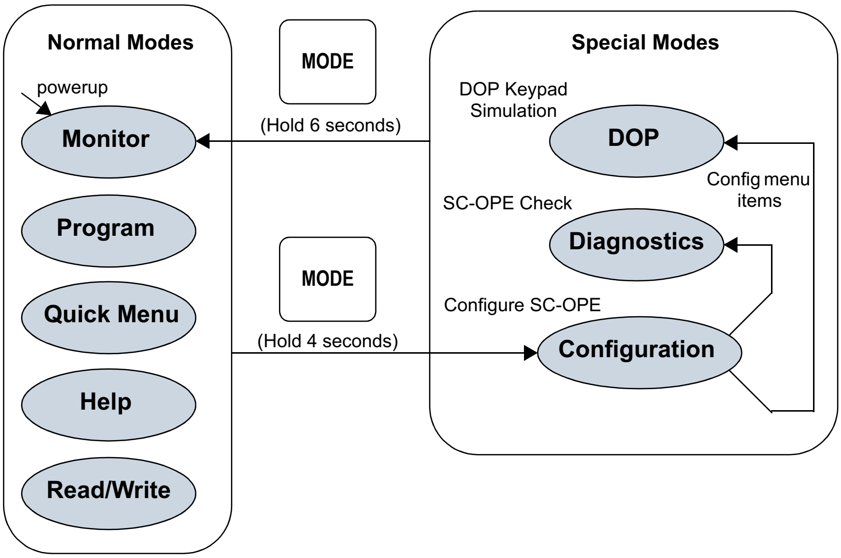
8 While the motor is rotating, press a key for another normal mode such as Program Mode. Note that the second line of the display shows the actual output frequency. This feature permits you to use other modes while still observing the actual output frequency.



Special SC-OPE Modes

The SC-OPE 3H memory contains operating firmware and communications settings. The operating firmware in the SC-OPE makes it specific to a particular inverter family. This data can be transferred to or from a PC disk file called a *configuration*. The SC-OPE has a special Configuration Mode for use during a firmware update. It is globally accessible from any of the four primary SC-OPE modes by pressing and holding the Mode Key. The following diagram shows the relationship of Transfer Mode to the other modes.

All SC-OPE Operating Modes



The diagram shows that the Mode key transitions the SC-OPE between Normal Modes and Special Modes, based on the duration of the Mode key press.

- Press the Mode key and *hold for 4 seconds* to enter Configuration Mode. The Config Transfer Mode is the beginning action (or mode) within Configuration Mode. Config Transfer Mode provides PC-to-SC-OPE configuration data transfers. Diagnostics and DOP operations are accessible from menu items from the Configuration Menu. After entering either of these modes, you will need to reset the SC-OPE to exit (see below).

- Press the Mode key and *hold for 6 seconds* to reset the SC-OPE and enter Monitor Mode.

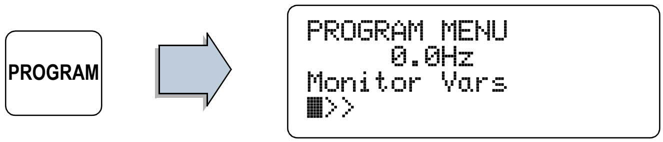
Program Mode

Programmable settings in the SC-OPE 3H include network port settings, SC-OPE operational modes, and inverter parameter settings. Parameter changes initially affect a *copy* of the inverter's parameters in its RAM to be used for motor control. A separate *Store to EEPROM* step writes any parameter change(s) to the inverter's non-volatile memory, so the changes are in effect upon the next powerup.

The Program Menu provides access to the programming capability outlined above.

To navigate through the Program Menu selections:

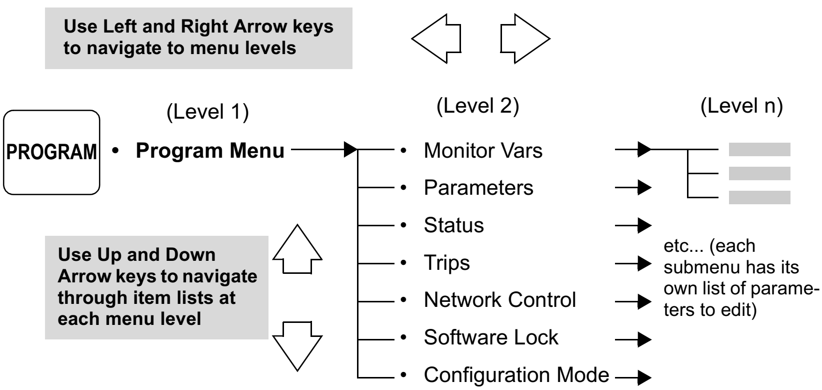
1 Press the Program key to access the Program Menu. Shown below, the bottom two lines indicate the menu level and item to be programmed. The second line displays inverter output frequency during programming.



2 Use the arrow keys to move *up* or *down* the list of items at the same level.

3 Use the *left* or *right* arrow keys to change levels.

Program Menu Summary The Program Menu structure has up to four levels. A summary of the Program Menu top level for all inverters is shown in the list below. Within the Parameters submenu, the SC-OPE presents only the inverter parameters which correspond to the inverter which is connected. A Program Menu map corresponding to each inverter family can be found in the appendices in this manual.

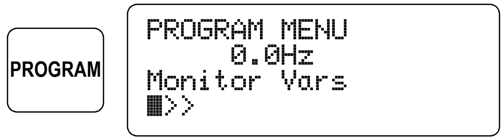


Program Mode Example

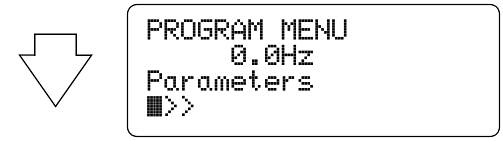
Within Program Mode you can navigate to various parameters (see previous page) and edit values or settings. The following general procedure shows how to navigate to a parameter, Change Data (edit the value), and either Enter (accept) the new value or Cancel (abort) the edit. The example edits A004 Max. Frequency.

To edit a parameter or setting in Program Mode:

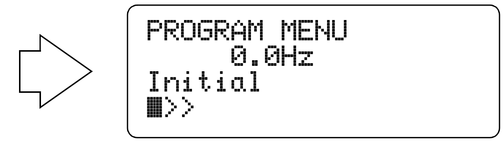
1 Press the Program key to enter Program Mode.



2 Press the Down Arrow key to move down the list by one item to Parameters.



3 Press the Right Arrow key to view the first item under Parameters: Initial.



4 Press the Down Arrow key to view the second item under Parameters: Base Setting.



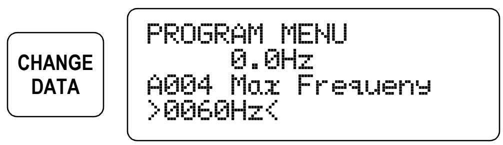
5 Press the Right Arrow key to view the first item under Base Setting.



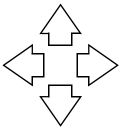
6 Press the Down Arrow key several times until parameter A004 Max Frequency appears.



7 Press the Change Data key to permit changing the data from the keypad. The symbols “>” and “<” indicate Change Data is active.



8 With the Change Data operation pending, use the Left and Right Arrow keys to move the cursor to specific digits. Increment or decrement a digit by using the Up Arrow or Down Arrow key respectively. In this example, make a small (safe) change to the value, or leave it at its current value.



```
PROGRAM MENU
     0.0Hz
A004 Max Frequency
>0055Hz<
```

9 Press the Store/Enter key to accept the new value for *A004 Max Frequency*. Note that the “>” and “<” characters are now absent; a Change Data is no longer pending.




```
PROGRAM MENU
     0.0Hz
A004 Max Frequency
█  55Hz
```

You can change one or more parameters in any Program Mode session. It is very important to remember the following points:

- Program Mode changes to inverter parameters affect only the inverter’s present copy of those parameters in inverter RAM. It will use these parameters for motor control.
- Changes made to parameters in inverter RAM are not retained during inverter power loss.

The next major section, “SC-OPE and Inverter Memory Resources” on page 3–17, describes how to more permanently apply your Change Data updates to the inverter’s EEPROM, which are loaded to its RAM for use upon each powerup.

Program Mode Edit Permissions

Hitachi inverters have many user-settable parameters and functions. The inverter monitors various conditions and signals to appropriately allow or prevent editing on a parameter-by-parameter basis. At any point in time, each inverter parameter or functions has an edit permission (allowed or prevented) associated with it. The inverter enforces edit permissions when you use the standard Hitachi keypad that comes with the inverter. When the SC-OPE is connected to the inverter, then the SC-OPE monitors the same conditions and signals as the inverter would do in order apply the same edit permissions.

Conditions and signals which determine the edit permission for each parameter are:

- Software Lock Mode setting (B031)
- Inverter Run Mode / Stop Mode status
- [SFT] Software Lock intelligent input state (only when an intelligent input is defined as [SFT])
- Run Mode Edit classification of standard parameters (as listed with check “✔”or ex “✘” mark in the parameter tables in the inverter instruction manuals)
- Parameters in special categories, which include B031, F001, and the Multi-speed parameters (Ax20, and A021 to A035)

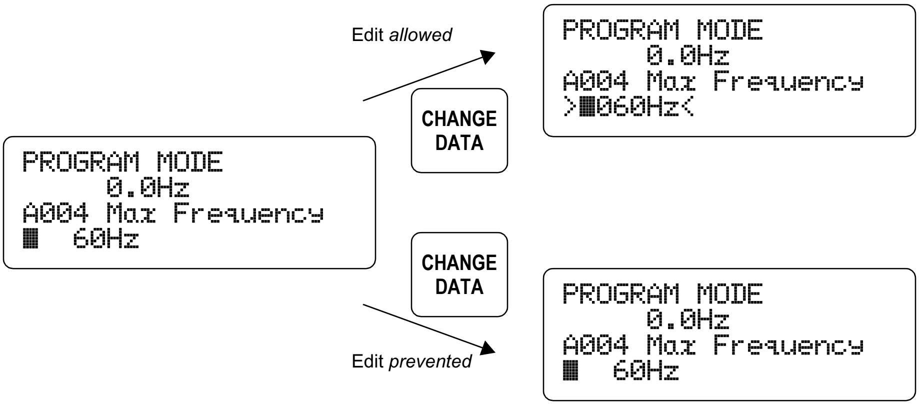
The particular Software Lock Mode (setting B031) in use establishes the general permission levels for all parameters. However, some parameters that directly affect inverter output operation *cannot* be edited when the inverter is in Run Mode, regardless of which Software Lock Mode is in use. In addition, the optional [SFT] intelligent input state works in combination with the Software Lock Mode in real time to modify the edit permission level. To determine when parameters can/cannot be edited for various conditions, please refer to the inverter instruction manual sections on Software Lock Mode (B031) and the section on [SFT] intelligent input operation.

Program Mode Behavior The SC-OPE monitors the conditions and signals listed above during Program Mode use. It evaluates the edit permission (either *allowed* or *prevented*) in real time for each parameter when:

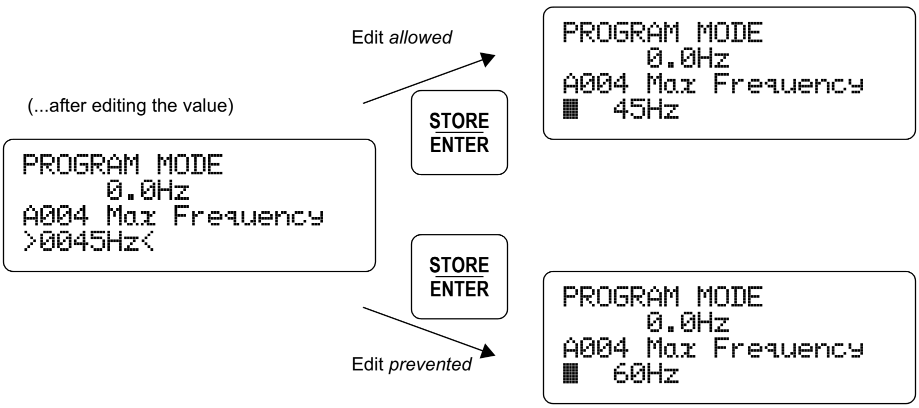
- ...you navigate to a parameter you want to edit and press the Change Data key, or
- ...you have tentatively edited a parameter value and then press the Store/Enter key

Note: *The SC-OPE re-evaluates the edit permission for each parameter when the Store/Enter key is pressed, because the state of the [SFT] input (if in use) could change just after you press the Change Data key.*

Change Data key The “> <” edit cursors normally appear after pressing the Change Data key. If the current edit permission result prevents editing, the edit cursors will not appear — indicating editing is prevented.

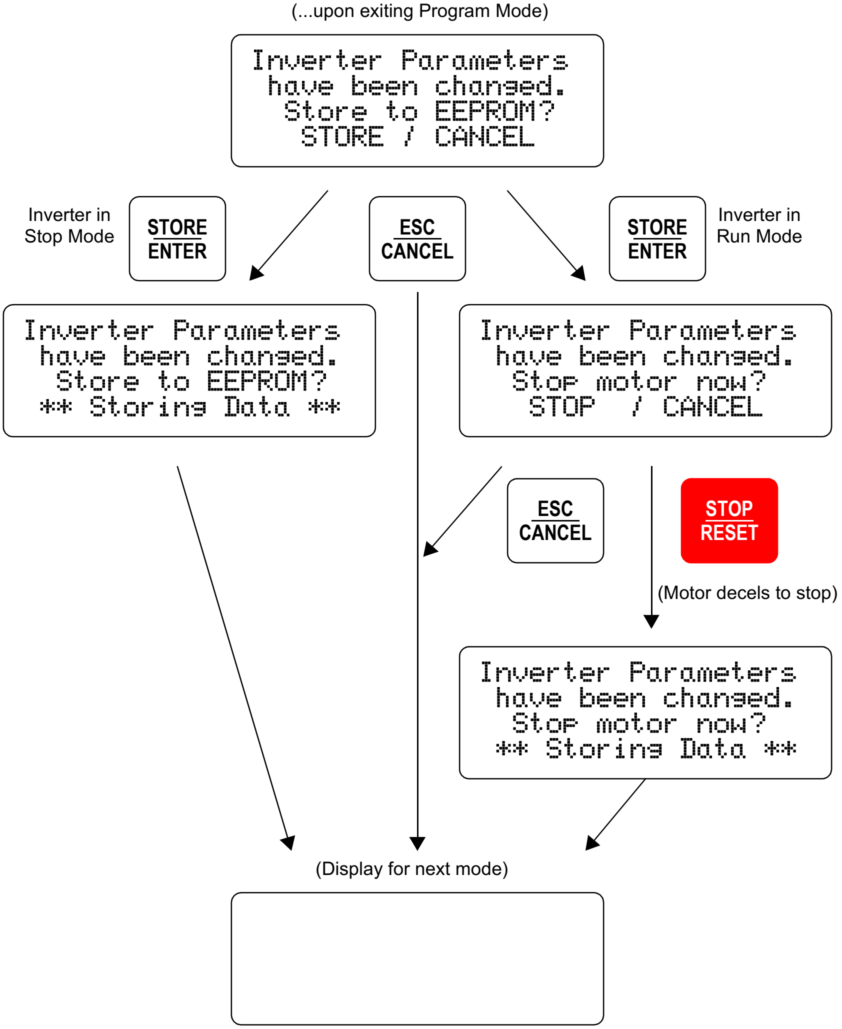


Store/Enter key After pressing the Store/Enter key in an allowable edit, the “> <” edit cursors normally disappear, leaving the new parameter value. If the current edit permission result prevents editing, pressing the Store/Enter key will be the same as pressing the Esc/Cancel key — the “> <” edit cursors disappear, and the value displayed returns to the original (actual) parameter value in the inverter.



Stopping the Motor Before Storing Edits (SJ100/L100)

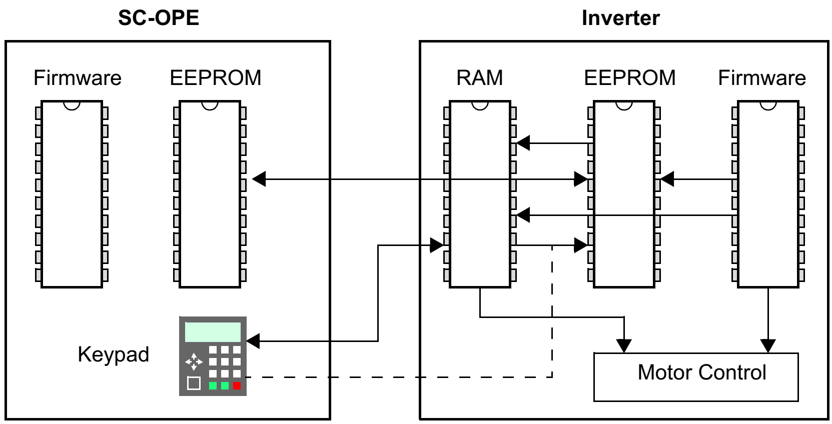
When you edit one or more parameter values and exit Program Mode, the SC-OPE will first prompt you to store the changes to the inverter's EEPROM. If the motor is running at that time, the inverter (SJ100/L100 series only) will need to stop the motor before performing the memory update. Rather than simply apply a free-run stop, the SC-OPE will prompt you to stop the motor (applies controlled deceleration). You can also choose to cancel the storing of parameters, which leaves the motor running.



SC-OPE and Inverter Memory Resources

Overview

The block diagram below shows representative memory resources in the SC-OPE and inverter. Events or operations transfer parameter data among these resources.

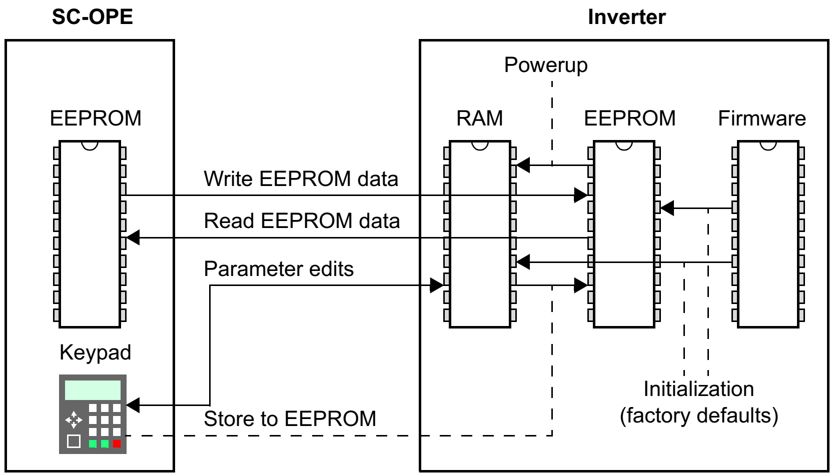


The SC-OPE and inverter memory resources operate according to the following:

- **SC-OPE EEPROM** It is the destination or source in Read / Write operations, respectively. The EEPROM data is retained during power loss. This is required when copying one inverter's parameters settings to another inverter.
- **SC-OPE Firmware** Stores the SC-OPE's operating system, which includes the protocols needed to communicate with specific inverter families. Updating the firmware is necessary when you want to configure the SC-OPE to operate with a different inverter family (requires the use of a PC with the SC-OPE Configuration Editor software).
- **Inverter RAM** The inverter's scratchpad (temporary) memory area, which contains parameters for real-time motor control. These parameters may be edited during operation. However, the RAM does not retain data during power loss.
- **Inverter EEPROM** Stores parameters which are used in real time for motor control in the inverter. Its contents are non-volatile — preserved during power loss.
- **Inverter Firmware** Contents include the factory default parameter values. When you perform an initialization of the inverter to restore the factory defaults, these default values are transferred from the firmware to the EEPROM.

Data Operations

The block diagram below shows data operations or events that transfer parameters from one memory resource to another.



- **Read EEPROM data** Transfers parameter values from the inverter EEPROM to the SC-OPE EEPROM. This operation is available from the Read/Write Menu, and is a component of the Copy Unit function of the SC-OPE.
- **Write EEPROM data** Transfers parameter values from the SC-OPE EEPROM to the inverter's EEPROM. This operation is available from the Read/Write Menu, and is a component of the Copy Unit function of the SC-OPE.
- **Parameter edits** Changes the value of (usually one) inverter parameter in RAM. The inverter will operate with this changed value, but it will not be retained during inverter power loss.
- **Store to EEPROM** Copies the inverter's RAM image of all parameters to its EEPROM. This step is necessary for any parameters edits to be retained upon the next powerup of the inverter.
- **Powerup** Automatically copies the inverter's EEPROM parameter image to its RAM, where it is used in motor control and to receive operator parameter edits.
- **Initialization** This operation restores factory default parameter values in the inverter by copying them from its firmware (permanent memory) to its EEPROM (retentive memory) and RAM (working memory). This operation is available in the Program Menu.

Quick Menu Operation

The Quick Menu in the SC-OPE is a time-saving feature designed to group the most often-used parameters for monitoring or programming for the operator. Accessible with a single key press (Quick Menu key), the menu item list can contain up to 32 programmable items.

The last item on the Quick Menu list is fixed and special in that it enables you to apply any data changes to the inverter. You may accumulate data changes (edits) in either Program Mode or when using the Quick Menu. These accumulated changes will be in the inverter's RAM, and are pending transfer to the inverter's EEPROM.



Note: The Store to EEPROM operation in the Quick Menu simply causes the inverter to copy its working parameters in RAM to its retentive memory (EEPROM). In contrast, the SC-OPE's Read/Write Menu provides the transfer of all inverter parameter settings to/from the SC-OPE's memory for transfer from one inverter to another ("copy unit" function). See "Copying Parameters Between Inverters" on page 3–25.

Storing to EEPROM

After any change to a parameter(s) value in the inverter's RAM, an additional *Store to EEPROM* operation is required to permanently update the inverter's parameters so they are in effect upon the next inverter powerup. Since the inverter uses the RAM data in real time, only one Store to EEPROM operation is required before powerdown. Note that each of the following operations edit parameter values RAM:

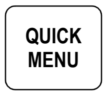
- Program Mode, editing any parameter value
- Monitor Mode, incrementing/decrementing the Output Frequency Setting (F001)
- Monitor Mode, changing the Hand/Auto setting, which updates the Run Command Source Setting (A002) and/or the Frequency Source Setting (A001)

Caution: *Any keypad operation in Program Mode or Monitor Mode can only change parameter value(s) in the inverter's RAM. In order for the inverter to resume operation after a power cycle by using your latest parameters, it is essential to perform a Store to EEPROM operation before leaving the SC-OPE and inverter.*

To perform a Store to EEPROM operation:

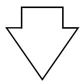
1 Complete any desired parameter edits (will be in inverter's RAM).

2 Press the Quick Menu key.




```
QUICK MENU
     0.0Hz
A001 Freq Set Freq
■[ENTER]
```

3 Press the Down Arrow key as needed to reach the bottom of the Quick Menu list for the Store to EEPROM menu item (or press the Up Arrow key once; the list navigation is also rotary in design).



press as needed

```
QUICK MENU
     0.0Hz
Store to EEPROM
■[ENTER]
```

4 Press the Store/Enter key to move (store) parameters from the inverter's RAM to its EEPROM. The status "Storing data" displays for a few seconds. When completed, the parameter values will then be in the EEPROM, used in the next powerup of the inverter.




```
QUICK MENU
     0.0Hz
Store to EEPROM
■Storing data
```

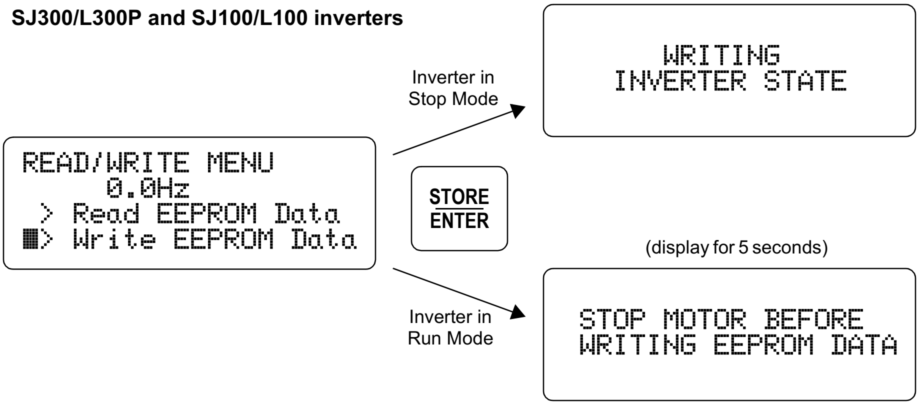
Quick Menu Edit Permissions

Some Quick Menu selections write data to the inverter's EEPROM, usually requiring the inverter to be in Stop Mode. These Quick Menu selections are:

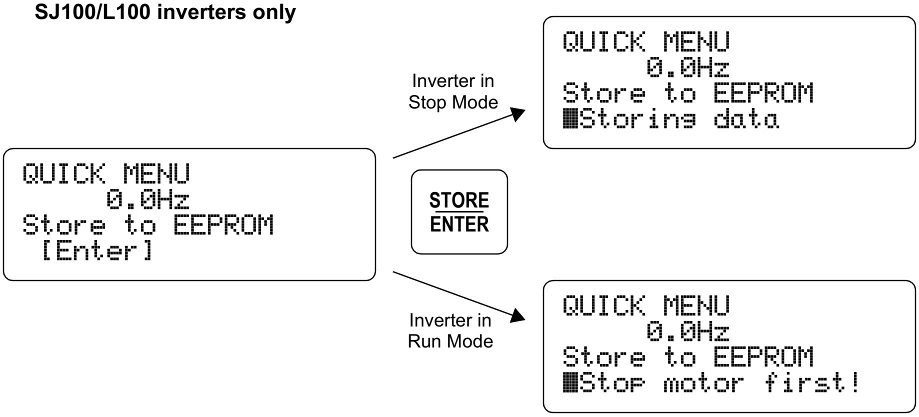
- Read/Write Menu, Write EEPROM Data operation (edit permission required for all inverters)
- Store to EEPROM (only SJ100/L100 inverters *must* be in Stop Mode)

Note that these operations do not rely on the Software Lock Mode, [SFT] intelligent input, or related conditions. This is because the inverter's RAM, which contains working parameters while running, is not affected in an EEPROM write operation.

SJ300/L300P and SJ100/L100 inverters



SJ100/L100 inverters only



Quick Menu Standard Items

The remaining Quick Menu items represent a subset of the inverter's parameters. For example, the second (default) item in the Quick Menu is shown in the display. Changing a parameter value in the Quick Menu is easy — the procedure is the same as the one in Program Mode (described previously in this chapter). Just use the Change Data key, Store/Enter key, and Esc/Cancel key as before.



Configuring the Quick Menu

You can select which items are on the Quick Menu list. This feature is useful for particular market segments or applications, or any time you know in advance which parameters will be edited most often. To configure the Quick Menu in the SC-OPE, you will need the Configuration Kit, SC-OPE-3CK. Install the Configuration Editor as described in Chapter 2.

To configure the Quick Menu:

1 Connect the configuration cable from the SC-OPE's front network (RS-232) port to a Comm port on the PC.

2 From the Windows desktop, click Start > Programs > Hitachi > SC-OPE 3 Editor.

Note: *If necessary, configure the Configuration Editor's COM port settings to match the port used to connect to the SC-OPE. (Click Editor > Set COM Port Option).*

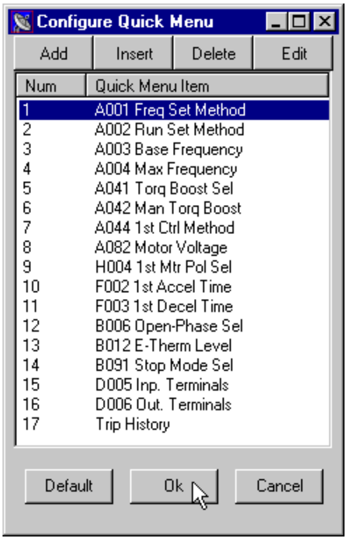
3 Click Transfer > Upload Configuration.

4 Place the SC-OPE in Config Transfer Mode by holding down the Mode key for 4 seconds.

5 If the SC-OPE is ready, refer back to the PC and in the Set Up Upload dialog box, click OK.

6 When the Information dialog box indicates Upload Complete, click OK. The untitled SC-OPE Configuration just uploaded will appear in a window in the Configuration Editor.

7 In the Quick Menu Configuration group, click the Setup button. The Configure Quick Menu dialog box will appear as shown. The list of parameters is the current Quick Menu in the SC-OPE.



8 You can make edits by using the buttons at the top of the Configure Quick Menu dialog box.

- **Add** – Click Add to add a new item to the bottom of the menu list. Select the parameter from the pop-up menu and click OK.
- **Insert** – Click Insert to insert a new item just above the currently selected item in the menu list. Select the parameter from the pop-up menu and click OK.
- **Delete** – Click Delete to delete the currently selected item in the menu list. Then click OK.
- **Edit** – Click Edit to replace the currently selected item in the menu list. Select the new parameter from the pop-up menu and click OK.
- **Default** – Click Default to restore the factory default list.
- **Cancel** – Click Cancel to discard edit(s) to the Quick Menu Configuration in the Editor.
- **OK** – Click OK to accept the changes to the Quick Menu Configuration.

To download the new Quick Menu to the SC-OPE:

1 From the Configuration Editor’s main menu, click Transfer > Download Configuration.

2 Confirm the communications cable is connected.

3 Confirm the SC-OPE is in Config Transfer Mode, or restore that mode by pressing the Mode key for 4 seconds.

4 In the Setup Download dialog box, click OK.

5 In the Information dialog box, click OK.

Copying Parameters Between Inverters

The SC-OPE provides a "copy unit" function — you can copy one inverter's parameters into another inverter. This capability is often needed in OEM situations. A copy operation consists of two parts:

1. Read one inverter's parameters into the SC-OPE's EEPROM.

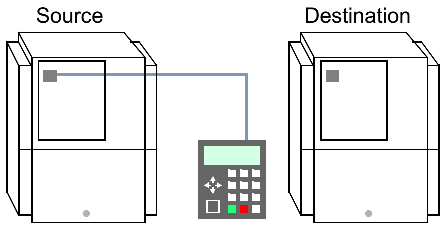
2. Write the parameters stored in the SC-OPE to the second inverter's EEPROM.

Caution: *Be sure to power OFF each inverter before connecting / disconnecting the SC-OPE. Otherwise, damage to the inverter or SC-OPE may occur.*

Note: *The steps in the following example use a cable to connect the SC-OPE to the inverter. You could install the SC-OPE in each inverter's keypad bay instead.*

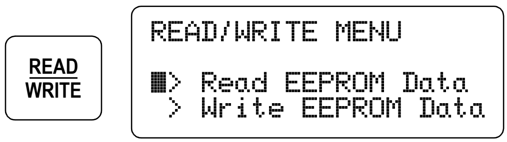
To perform a copy operation:

1 Connect the SC-OPE to the inverter which contains the parameter settings you want to use as the source.



2 Press the Read/Write Menu key to access the Read/Write Menu as shown.

Note: *You can use the Up and Down Arrow keys to select either the read or write operation.*



3 With the read operation selected, press Store/Enter to perform the Read EEPROM Data. After a few seconds the SC-OPE displays the confirmation message as shown.

STORE ENTER

```
READING
INVERTER STATE
```

(automatic)

```
INVERTER STATE
STORED IN MEMORY
```

4 Press the Esc/Cancel key to return to the default Monitor Mode (or press the Monitor Mode key).

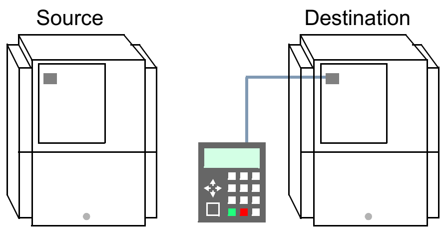
ESC CANCEL

```
  0.0A    0.0% 0.00kW
█   0.00      0.00Hz
Run:OPE/Frq:OPE
Norm Stop / Net Ctrl
```

5 Power OFF the inverter and disconnect the SC-OPE.

6 Connect the SC-OPE to the destination inverter of the parameter set.

7 Power ON the inverter.



Note: *Do not run the motor; the inverter cannot update all of its parameters while it is in Run Mode.*

8 Press the Read/Write Menu key to access the Read/Write operations as shown.

9 Press the Down Arrow key to select Write EEPROM Data.

```
READ/WRITE MENU

 > Read EEPROM Data
█> Write EEPROM Data
```

10 Press the Store/Enter key. The “Writing Inverter State” message will display for a few seconds.

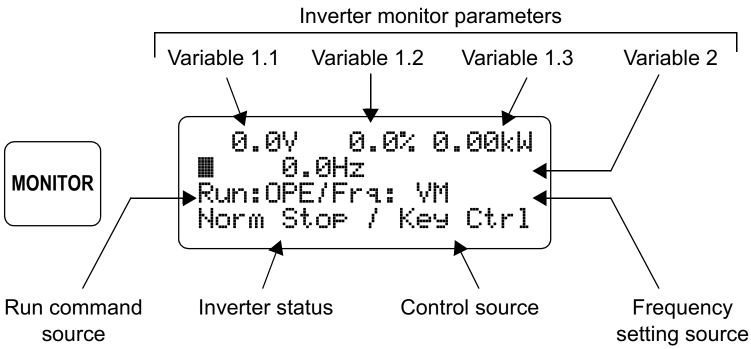
The *copy operation* is complete! You have copied one inverter’s entire parameter set to another inverter. Those parameters are still in the SC-OPE’s EEPROM, so you can connect the SC-OPE to other (destination) inverters to update their parameters in the same way.

Monitor Mode

The SC-OPE’s Monitor Mode is designed for operators to monitor important inverter data and control status during normal, day-to-day operations. Equipment operators and technicians will typically leave the SC-OPE in monitor mode at all times until the need to change a parameter value arises.

Orientation

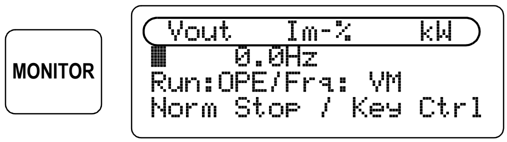
The screen layout in Monitor Mode consists of dedicated text field locations as shown below. The upper two lines display inverter variables. The field locations have reference numbers so you can configure which inverter variable is displayed in each field. The third line displays the current source of the Run Command and the main Frequency Setting. The fourth line displays the inverter status and the current control source for the SC-OPE (keypad or network connection). The Monitor Mode screen below shows the inverter in a normal stop condition.



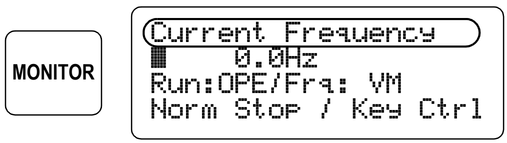
Inverter Variable Monitoring

In addition to displaying the values, you may occasionally need to refer to the variable *names*. For example, a reading of “0.0%” could refer to torque or current.

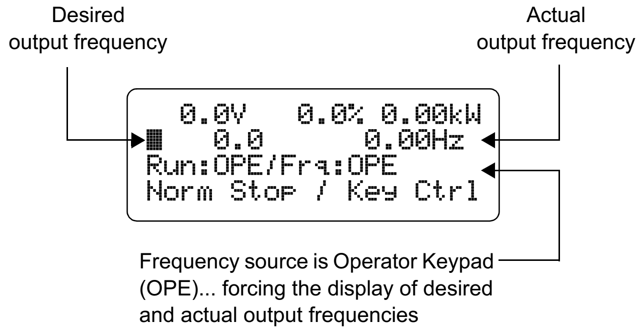
Press the Monitor Mode key to view the names of the variables in positions 1.1, 1.2, and 1.3 (display line 1).



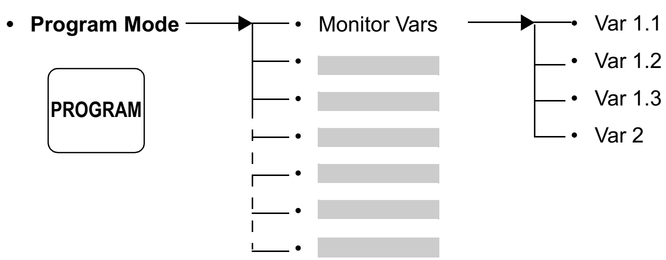
Press the Monitor Mode key again to view the name of the variable in position 2 (display line 2). Press the Monitor Mode key once more to return to the initial display.



When the source of Frequency Setting is the Operator Keypad (OPE), the second line becomes dedicated to displaying the set frequency and actual frequency (pre-configured variable 2 output is suppressed). This feature is useful to help machine operators avoid severe frequency over-shoot / undershoot when the set acceleration and deceleration rates are relatively low.



Program Mode provides access to change the four variables you can display on the upper two display lines. The figure below shows the location of the “Monitor Vars” submenu within the menu list in Program Mode.



To configure the Monitor Vars:

1 Press the Program Mode key. Monitor Vars is at the top of the Program Mode menu list (normally displayed first unless a prior Program Mode session is active.)

2 Press the Up and Down Arrow Keys if necessary to access the Monitor Vars item.

3 Press the Right Arrow key to enter the Monitor Vars sub-menu. The example display to the right shows that the current setting for Var 1.1 is “Output Current (A).”

```
PROGRAM MODE
     0.0Hz
VAR 1.1
■Output Current (A)
```

4 Use the Down Arrow key to scroll to the other Monitor Vars items, if necessary.

5 Press the Change Data key to change a particular Monitor Var. The “>” and “<” characters indicate Change Data is active.

```
PROGRAM MODE
     0.0Hz
VAR 1.1
>Output Voltage (V)<
```

6 Use the Up Arrow and Down Arrow keys to scroll through the list of available variables. Stop at the desired variable such as “Output Voltage (V).”

7 Press Store/Enter to accept the new Monitor Var. To abort the Change Data operation, press the Esc/Cancel key.

8 When you press the Monitor key, the new Monitor Variable will display in the corresponding field.

Output voltage (V)

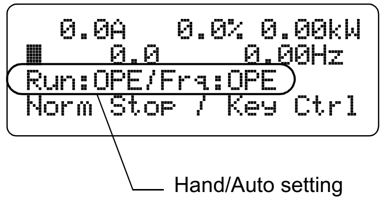
```
  0.0V   0.0% 0.00kW
■    0.0     0.00Hz
Run:OPE/Frq:OPE
Norm Stop / Key Ctrl
```

***Note:** The Monitor Vars configuration is part of a SC-OPE configuration. The SC-OPE Configuration Editor on the PC does not show Monitor Vars status — you must use the Program Mode on the SC-OPE to configure Monitor Vars.*

Hand/Auto Key Operation

Monitor Mode is the central mode for operator-based control of the inverter, and it shows the current status of the user-selectable inverter control sources:

- Run Command Source — set by parameter A002
- Frequency Setting Source — set by parameter A001



The Hand/Auto key serves the purpose of letting the operator scroll through and set applicable combinations of the above source selections. Each press of the Hand/Auto key increments to the next combination of Run Command Source / Freq. Setting Source. The current settings are displayed on the third line of the display as shown. The table below shows the available combinations inverter settings.

Hand/ Auto Select	Run Command Source		Freq. Command Source	
	Display	A002 Value	Display	A001 Value
1	OPE	02 = Operator keypad (REM)	OPE	02 = Operator keypad (REM)
2			VM	00 = Keypad potentiometer (VR)
3			TRM	01 = Control terminal (TRM)
4	TRM	01 = Control terminals (TRM)	TRM	01 = Control terminal (TRM)
5			VM	00 = Keypad potentiometer (VR)
6			OPE	02 = Operator keypad (REM)

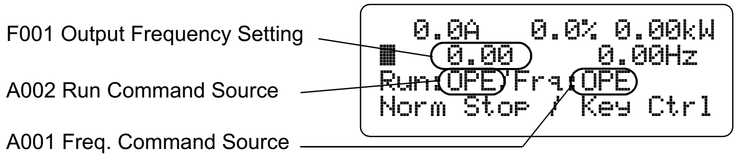
When the SC-OPE is in another normal mode (such as Program Mode or Quick Menu), a press of the Hand/Auto key will automatically switch to Monitor Mode *and* increment the Hand/Auto setting.

Note: *Any Hand/Auto setting change immediately changes parameters A001 and A002 in the inverter. However, you must perform a Store to EEPROM operation (available in the Quick Menu) to store the change to retentive memory.*

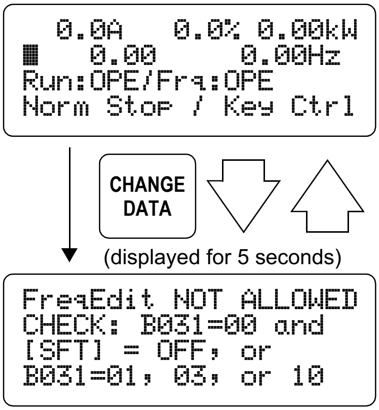
Note: *Control of the inverter via a network connection to the SC-OPE requires that you use the Hand/Auto setting Run:OPE / Frq:OPE. This will permit the SC-OPE to send network command values to A002 and A001 inverter parameters, respectively.*

Monitor Mode Edit Permissions

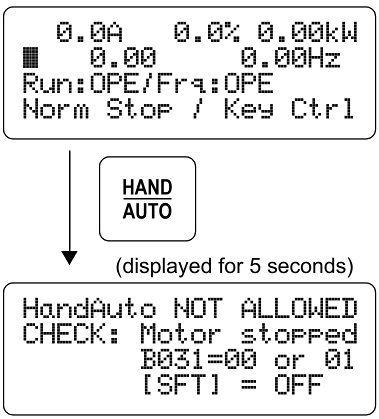
As discussed in the Program Mode section (see page 3–14), the SC-OPE monitors the inverter's Software Lock Mode setting, Run/Stop Mode status, [SFT] intelligent input status, etc. This enables the SC-OPE to allow or prevent the editing of inverter parameters, as appropriate for each parameter in real time. Although Program Mode is the obvious method to edit parameter values, Monitor Mode also provides edit capability for specific parameters as shown below. The section "Motor Control from the SC-OPE" on page 3–8 introduced the Monitor Mode display of these parameters and how to edit or change them.



Output Frequency Editing The Change Data key provides access to edit the Output Frequency Setting (F001), and the "< >" edit cursors appear. Then the Up/Down Arrow keys will immediately increment/decrement the frequency value with each key press. If the status of the Software Lock Mode or other conditions prevent editing the output frequency at any point, pressing the Change Data key or Up/Down Arrow keys will cause the SC-OPE to display the message shown to the right. Use the checklist to verify that conditions allow parameter editing.



Similarly, pressing the Hand/Auto key immediately updates the Run Command Source (A002) and/or the Frequency Command Source (A001). If the status of the Software Lock Mode or other conditions prevent the editing of these parameters, pressing the Hand/Auto key will cause the SC-OPE to display the message shown to the right. Use the checklist to verify that conditions allow parameter editing.

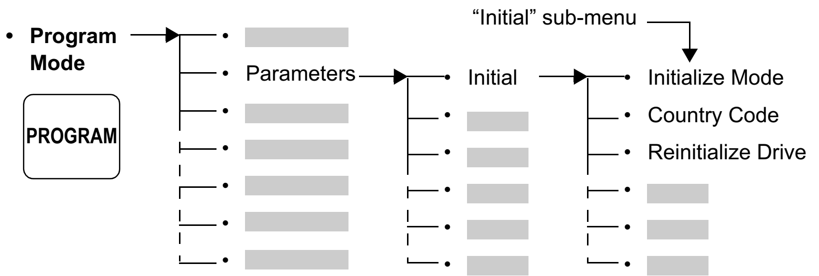


Restoring Factory Default Inverter Settings

The parameters in a new inverter will already match the default values applicable for your country. However, you may eventually need to initialize an inverter's parameters just to establish a starting point for troubleshooting, etc. The initialization procedure will restore inverter parameters to their factory default values, clear trip history information, or both. Parameter initialization makes use of a "country code" setting (Japan, the U.S., or Europe) for slightly different parameter values.

Note: *This initialization procedure applies* ***only to SJ300 and L300P*** *inverters. Initializing SJ100 / L100 inverters requires disconnecting the SC-OPE and using the inverter's keypad. The J300 inverters require an input signal on terminal STN. Follow the initialization procedure in each inverter's instruction manual.*

The initialization functions are accessible in the Program Mode menu. The menu organization of these menu items is shown below.



To initialize inverter parameters:

1 Press the Program Mode key, and navigate to the "Initial" submenu (see Program Mode menu map above).

2 Verify the options for Initialize Mode are as you require. If necessary, press the Change Data key, scroll to the desired setting listed below, and press the Store/Enter key.

Initialization Options:

- Trip history only
- Both trip history and inverter parameter data
- Inverter parameter only

3 Press the Down Arrow key to scroll down to the Reintialize Drive menu item.

4 Press the Right Arrow key to get the display as shown.

```
PROGRAM MODE
     0.0Hz
ENTER=yes / ESC=no
■[Enter]
```

5 Press Store/Enter to initialize, or Esc/Cancel to abort.

Using Networks for Inverter Operation

4

In This Chapter. . . . page

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• Connecting to a DirectNet Network 23
• Connecting to an Allen-Bradley DF1 Network 28

Setting Up a Network Interface

Introduction

In addition to providing a full-featured operator interface, the SC-OPE 3H provides a factory network interface function. Using a factory network allows a host computer or controller to command multiple inverters on a single network. Each inverter will have its own address (or station number) on the network (except for Allen-Bradley DF1). The protocol you will need to use is determined by the requirements of the master controller (or host) on the factory network. The SC-OPE is configurable to use one of the following networks:

Protocol	Inverter Address Range	Default Address
DirectNet	1 to 90	1
Allen-Bradley DF1	—	—
ModBus RTU	1 to 255	1
ModBus ASCII	1 to 255	1
Metasys N2	1 to 255	2

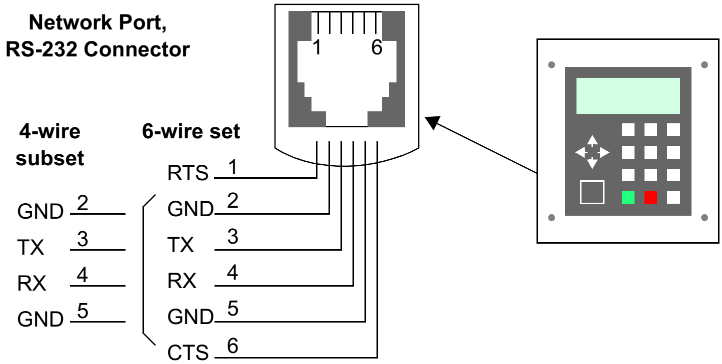
Network Port Mode (Electrical) Selection The electrical characteristics of your factory network will be selected independently of the protocol selection. Factors which determine the proper electrical mode include the network length, number of inverters on the network, and the serial port electrical characteristics of the network master computer. In simplex operation, the same wires are used alternately for transmitting and receiving. Half duplex operation uses separate transmit and receive wiring, but only one half (TX or RX) will be in operation at a time. Note that while some protocols support up to 255 node addresses (address of each device), RS-485 networks are limited to a maximum of 32 devices.

The following table lists the SC-OPE serial port modes and the typical application for each one:

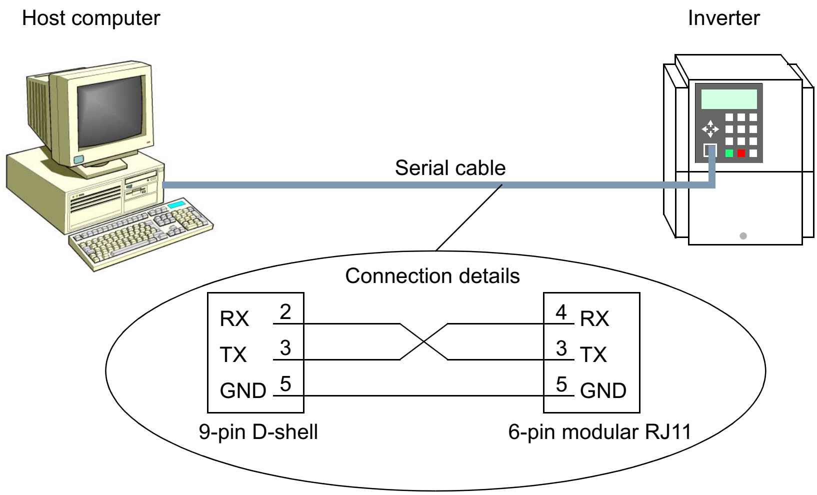
Communications Mode	Application			Network Port Connector
	Distance	Devices	Simplex/ Duplex	
RS-232	Up to 15 m	2 only	Half duplex	Front (RJ11)
RS-485 2-wire	Up to 100 m	Up to 32	Simplex	Bottom (10-pin)
RS-485 4-wire	Up to 100 m	Up to 32	Half duplex	Bottom (10-pin)
RS-422 4-wire	Up to 100 m	Up to 2	Half duplex	Bottom (10-pin)

RS-232 Serial Port Wiring Diagrams

The RS-232 Port is accessible on the front panel of the SC-OPE as shown below. Its most common use is for connecting to a PC for OEM configuration tasks. However, the serial port can respond to network commands, with the proper SC-OPE configuration). The cable included in the Configuration Kit has a 4-wire RJ11 connector, using the 4-wire subset. You can also make a custom cable (using the 6-wire set or the 4-wire subset) and connect the SC-OPE to a PC or host computer.



A typical RS-232 network port connection is between a PC and the SC-OPE only.



An RS-232 connection provides an easy way to connect two devices. Since the connection is limited to only two devices, RS-232 type communications is not a part of the 2-wire network discussion.

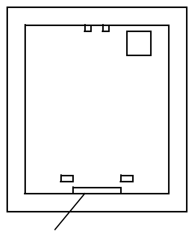
Guidelines to configure a RS-232 connection:

- The port of the device you connect to the SC-OPE must also be RS-232 type.
- The TX line of one device connects to the RX line of the other device.
- Remember to make the ground connection between the two ports.
- The wiring distance will be limited to 50 feet at 19.2k baud.

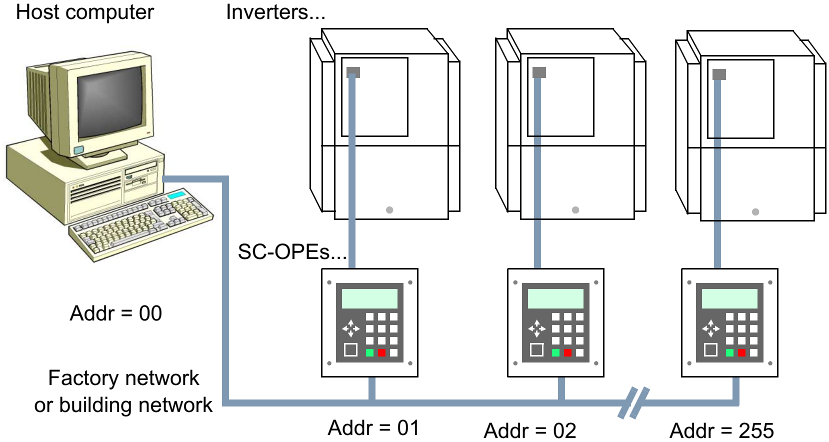
Note: *When using a factory network protocol, you can use the front panel network port for the connection. However, RS-232 signal levels limit the network to a point-to-point connection (SC-OPE and one other device). If your network requires more than two devices, use the RS-485 network port described on the following page. Alternatively, you can use the RS-232 port with an external RS-485 converter.*

Network Wiring Configurations

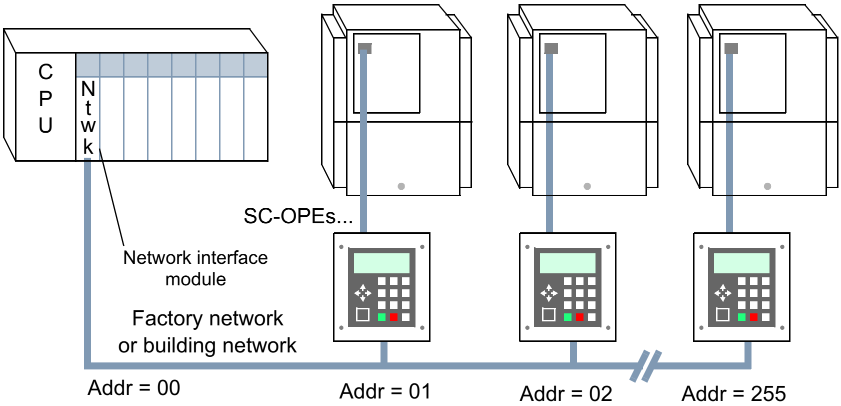
The RS-422/485 port is accessible on the 10-pin connector at the bottom of the SC-OPE assembly as shown below. The connector for use in making a matching cable is included in the Bezel Kit. The connector provides individual retention of wires, facilitating daisy-chain network topologies which are typical in factory networks with multiple inverters.



In a factory network with multiple inverters and/or end-to-end lengths of more than 15 meters (45 ft.), we recommend using the RS-422 / 485 network port. Networks with three or more devices will require using the RS-485 mode. Each SC-OPE must be configured with a unique network address (described later in this section).



Some factory networks originate in programmable logic controllers (PLCs). The CPU or network interface module in the base (as shown below) will provide the interface.

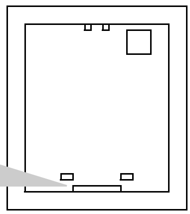


RS-422/485 Serial Port Wiring Diagrams

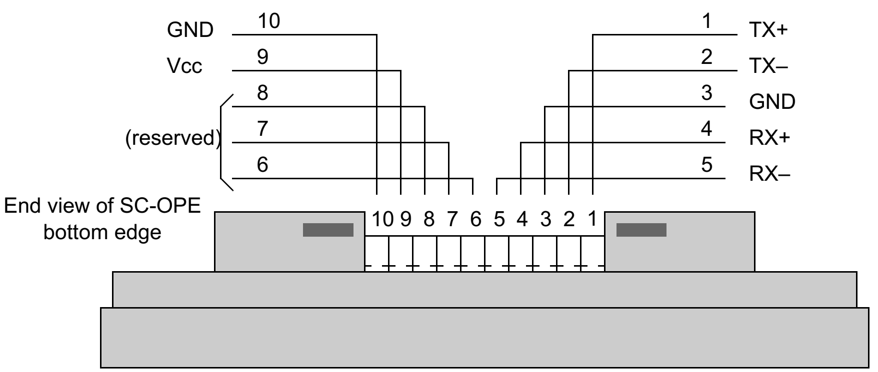
The SC-OPE's RS-422/485 port can connect to 2-wire or 4-wire networks as listed to the right. The figure below shows the port's connections. The power connections are typically unused, as the SC-OPE is powered by the inverter. For instructions on configuring the SC-OPE network ports, refer to page 2–26.

RS-422/485 port configurations:

- RS-485 2-wire
- RS-485 4-wire
- RS-422 4-wire



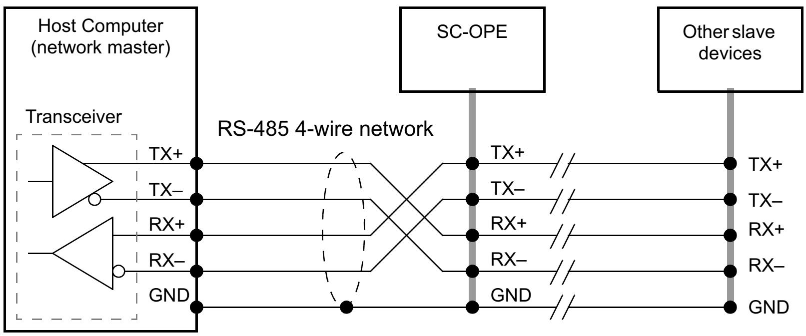
Network Port, RS-422/485 Connector



You will need to decide whether your network will be a 4-wire or 2-wire type. If any device on the network is a two-wire device (or otherwise has combined TX/RX lines), then the network must be a 2-wire type.

Guidelines to configure a 4-wire network:

- Configure the host computer or controller as the network master. The SC-OPE(s) on the network are the slave(s).
- Remember to configure the SC-OPE network port (refer to page 2–26).
- The master's TX and RX lines connect to the RX and TX lines on the slave(s) respectively. In other words, they cross: TX+ (master) connects to RX+ (slaves), and TX– (master) connects to RX– (slaves).
- Each device on the network must have a unique address.
- If you have more than one slave device, wire all of them (as a group) in parallel.
- Remember to make the ground connection between all ports on the network.
- Add network termination resistors (see page 4–8).
- Limit the total number of devices to 32 for RS-485.



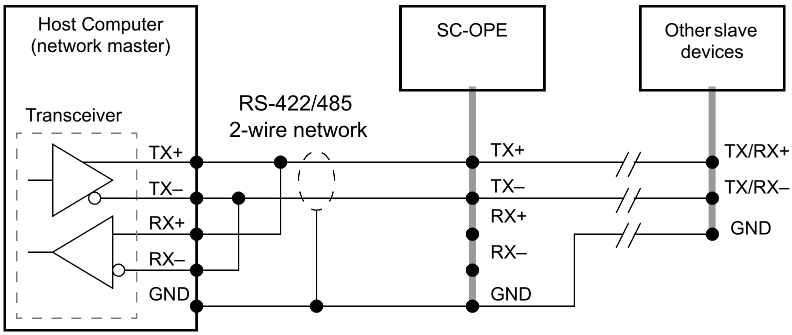
Guidelines to configure a 2-wire network:

- Configure the host computer or controller as the network master. The SC-OPE(s) on the network are the slave(s).
- Remember to configure the SC-OPE network port for 2-wire operation (refer to page 2–26).

(continued, next page...)

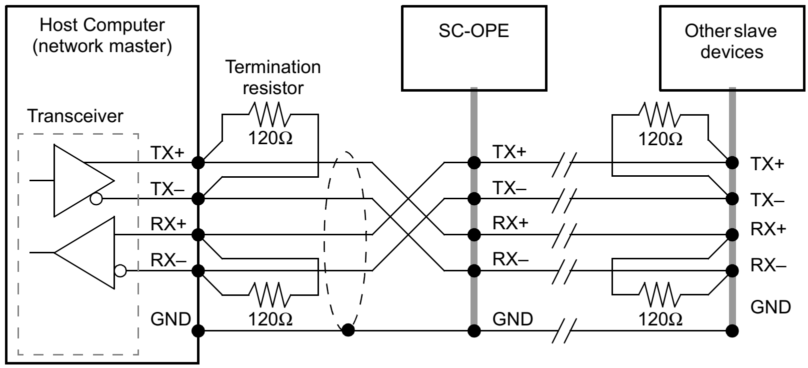
- The network master device or other devices on the network may also need firmware configuration to 2-wire operation. In this way, each device on the network will not attempt to transmit and receive at the same time (would cause a comm error).
- Connect only the TX+ and TX– lines of the SC-OPE to the network: That is, connect its TX+ to TX/RX+, connect its TX– to TX/RX–. This works only because the SC-OPE automatically connects transmit and receive circuits to the two lines.
- For wiring instructions of other network devices, refer to the respective product documentation from the manufacturer. But in general, we can say:
  - If the device has two wires (typically labeled TX/RX+ and TX/RX–), these connect directly to the network.
  - If the device has four wires, you may need to jumper its transmitter/receiver lines together. Jumper TX+ to RX+, and jumper TX– to RX–.
- All devices' TX/RX+ lines and TX/RX– lines connect in parallel.
- Remember to make the ground connection between all ports on the network.
- Add network termination resistors (see page 4–8). Note that the device at each end of the network will only have *one* termination resistor.
- Limit the total number of devices to 32 for RS-485, 2 for RS-422.
- Each device on the network must have a unique address.

The diagram below shows a 2-wire network. In this example, the host computer has a 4-wire port that has been jumpered for 2-wire operation. Sometimes a host computer will have internal jumpers or firmware settings that have the same effect as the jumpers shown. However they are configured, only two wires (plus GND) will connect one device to another.

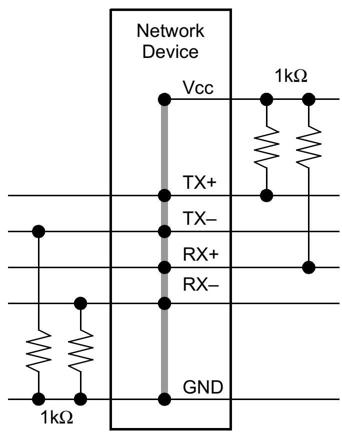


Network Termination

Termination Resistors When wiring a factory network it is important to consider the reliability and noise immunity of network communications. Differential transceivers provide general noise immunity. However, factors which degrade noise immunity include longer total network lengths, noisy environments, and a large number of devices on the network. The Network Termination Board (included in the Bezel Kit) contains network termination resistors. These resistors connect across TX+ / TX– and RX+ / RX– at the physical end of the wiring pairs as shown in the figure below.

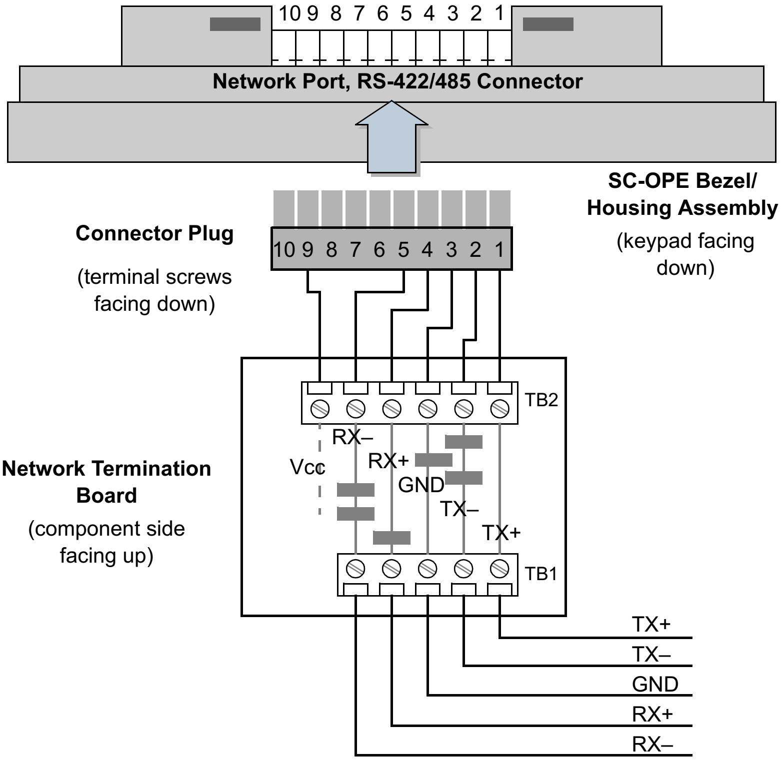


Bias Resistors A transceiver's differential signals are in a tri-state condition (floating, with respect to GND) between transmissions. This can make a network more susceptible to noise particularly with higher baud rates. The maximum speed of SC-OPE communications is 19.2 k Baud, still low enough for reliable communications in many applications. The Network Termination Board contains bias resistors. These include 1kΩ pull-up and pull-down resistors at each node.



Connecting a Network Termination Board

The Network Termination board contains termination and bias resistors. This board is a component in the Bezel Kit. Your network will need termination at the device on each physical end of the cabling. A wiring procedure is on the following page.



To install a Network Termination Board:

1 Mount the SC-OPE 3H in the bezel/housing and secure the SC-OPE assembly as outlined in Chapter 2, Installation.

2 Ensure the SC-OPE location will be at one physical end of the network cabling.

3 Locate the Connector Plug and Network Termination Board in the Bezel kit. Refer to the wiring diagram on the previous page. Use wires approximately 2” long to connect the Network Termination Board TB 2 connector to the Connector Plug. Take care to orient the two components as shown (board is component side up, connector block is screw terminal side down).

(continued, next page...)

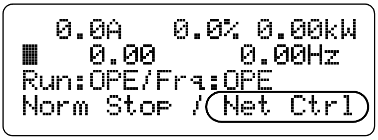
4 Plug the assembly into the network connector at the bottom of the SC-OPE.

5 Attach the network wiring to the Network Termination Board.

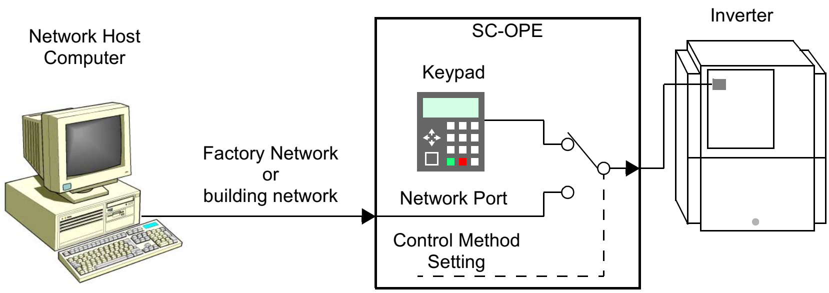
Note: *A host computer or another device besides the SC-OPE may be at one end of some networks. In this case, please refer to the device manufacturer's instructions regarding network termination. Some devices have internal termination resistors that may be connected/disconnected with jumpers.*

Tip: *If needed, you can use a Network Termination Board as termination for a device other than a SC-OPE. First, be sure that device does not already have built-in termination resistors.*

Configuring Network Control of Inverter



Network Control Setting The SC-OPE configuration contains the Control Method Setting which determines whether the SC-OPE keypad or the factory network commands received are in control of the inverter. Use Monitor Mode to view the current setting as shown. After you have connected a network host to the SC-OPE and you are ready to try network control, it will be necessary to change the Control Method Setting to “Network” (Net Ctrl). See “Selecting Keypad or Network Control” on page 3–4.



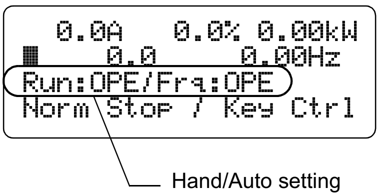
Hand/Auto Setting When receiving and interpreting network write commands, the SC-OPE will command the inverter as if an operator were using the SC-OPE (from the inverter’s point of view). If the inverter is configured for control via its own keypad or input terminal, it will ignore network commands sent via the SC-OPE. So, controlling the inverter from a network requires that you set the following:

- A002 Run Command Source = 02 (Operator keypad – REM) = Run:OPE
- A001 Frequency Setting Source = 02 (Operator keypad – REM) = Frq:OPE

If either source setting is set for control terminal operation, Run:TRM or Frq:TRM, the corresponding control from the network will not be possible. It is desirable, for some applications, to split the control source. For example, you may want network control of Run/Stop functions, and use control terminals for the frequency setting input — Run:OPE/Frq:TRM.



***Tip:** To automatically set A002 and A001 as required for network control, simple press the Hand/Auto key to select “OPE” as the Run Command and Frequency Setting sources as shown. More information on Hand/Auto operation is on page 3–30.*



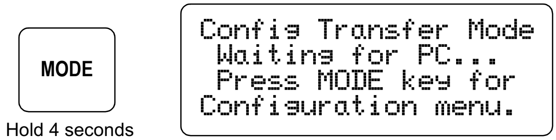
SC-OPE Network Configuration

The SC-OPE 3H supports several factory network protocols. You must configure it before connecting it to a particular factory network. The configuration may be edited directly on the SC-OPE, or you may use the Configuration Editor on a PC and download the configuration.

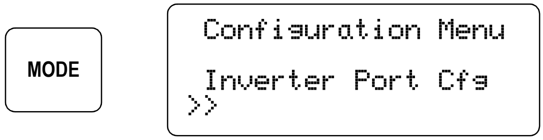
To configure a SC-OPE 3H for connecting to a DF1 factory network:

Press the keys shown in the sequence below.

1 Press the MODE key for 4 seconds.



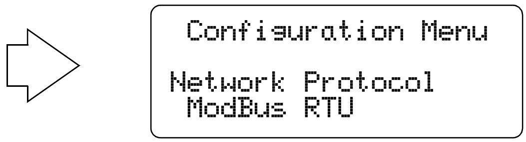
2 Press the MODE key again (briefly).



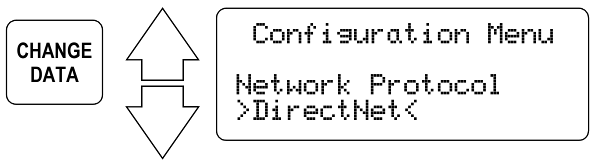
3 Press the Down Arrow key once.



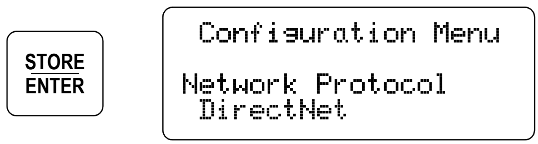
4 Press the Right Arrow key.



5 Press the Change Data key and use the Up Arrow key to select the desired protocol from the list.



6 Press the Store/Enter key to store the change (or Esc/Cancel to exit without changing).



7 Press the Down Arrow key to access the other network configuration parameters. to edit a parameter, use the Change Data key, the Arrow keys, and the Store/Enter key as in Step 5 and Step 6 above.

The complete Network Configuration submenu is shown below.

- **Configuration Menu**
  - Inverter Port Cfg
  - Network Port Cfg
    - Network Protocol
    - Network Address
    - Network Port Type
    - Baud Rate
    - Data Bits
    - Parity
    - Stop Bits
    - Flow Control
    - RTS Delay
    - Mode (Master/Slave)
    - Max Gap Time
    - Stop Key Action
  - Store Configuration

Note: *When editing the network node address, be sure to assign a unique number for each device on the network.*

```
 Configuration Menu

Network Address
 2
```

8 In the Network Port type setting, be sure your configuration matches the physical network connection that will exist on the SC-OPE.

```
 Configuration Menu

Network Port Type
 RS485 4-Wire
```

9 The Stop Key Action item (at bottom of list) selects whether the Stop/Reset key on the SC-OPE will be disabled (no action) or enabled (disables network control when pressed and returns control to the keypad). The proper setting depends on your particular application.

```
 Configuration Menu

Stop Key Action
 No Action
```

10 After making all the Change Data / Store changes to the network settings, press the Left Arrow key to exit the Network Settings submenu.

```
 Configuration Menu

Network Port Cfg
>>
```

11 Press the Down Arrow key to scroll down to the Store Configuration menu item.

```
 Configuration Menu

Store Configuration
[Enter}
```

12 Press the Store/ Enter key to store the configuration in the SC-OPE.

STORE
ENTER

```
 Configuration Menu

Store Configuration
Configuration Stored
```

13 Press the Down Arrow key twice to access the Monitor Mode menu item.

Press twice

```
 Configuration Menu

Monitor Mode
{Enter]
```

14 Press the Store/ Enter key to cause the SC-OPE to reset and enter Monitor Mode.

STORE
ENTER

```
-------- -----------
HITACHI AMERICA, Ltd
 SC-OPE 3H -L300P
----- Ver 2.10 -----
```

Limiting the Direction of Rotation

The SC-OPE 3H keypad automatically limits motor rotation to one direction for operator-initiated operation. Intelligent terminal configuration can also limit rotation for external inputs. However, a SC-OPE and inverter under network control may could respond to either a Run FWD or Run REV command. If Before you use the SC-OPE the first time in any application, it is very important to consider any motion restrictions the load may place on the motor.

Caution: *The SC-OPE 3H can respond to FWD Run and REV Run commands which are equally accessible via network commands. However, some machines are designed for rotation in only one direction — and may be damaged if run in the opposite direction. If you have such an application, you must follow the instructions in this section to protect against accidental reverse rotation.*

When a machine can run in only one direction, it is usually desirable to arbitrarily assign that direction as "forward," whether the actual rotation is clockwise or counter-clockwise. You can change the direction of rotation associated with a Run FWD command by swapping any two of the three wires going from the inverter to the motor.

Warning: *Be sure to power OFF the inverter for five minutes before opening the power terminal access panel. Otherwise, the danger of electric shock exists.*

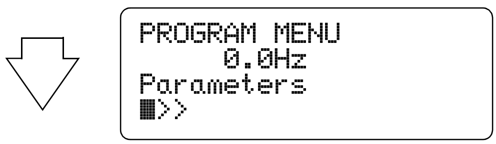
The procedure in this section shows how to disable either one of the Run commands (typically Run REV).

To restrict the Run commands to FWD only or REV only:

1 Press the Program Mode key to enter Program Mode.



2 Press the Down Arrow key to reach the Parameters menu item.



3 Press the Right Arrow key to enter the Parameters sub-menu list.

```
PROGRAM MENU
     0.0Hz
Initial
■>>
```

4 Press the Down Arrow key several times until you reach the Protection menu item.

several times

```
PROGRAM MENU
     0.0Hz
Protection
■>>
```

5 Press the Right Arrow key to enter the Protection sub-menu list.

```
PROGRAM MENU
     0.0Hz
E-Thermal
■>>
```

6 Press the Down Arrow key several times to access the Other menu item.

several times

```
PROGRAM MENU
     0.0Hz
Other
■>>
```

7 Press the Right Arrow key to enter the Other sub-menu. The first item is the Direction Restriction parameter.

```
PROGRAM MENU
     0.0Hz
B035 Dir. Restrict
■FREE
```

8 Press the Change Data key to enable the Change Data function.

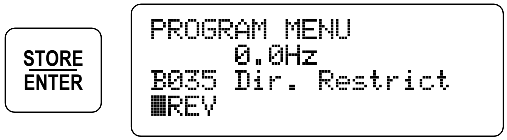
CHANGE DATA

```
PROGRAM MENU
     0.0Hz
B035 Dir. Restrict
>FREE<
```

9 Use the Up Arrow and Down Arrow keys to scroll through the available settings: Free, REV, FWD. Most applications will be set to "REV" to disable the Run REV command.

```
PROGRAM MENU
     0.0Hz
B035 Dir. Restrict
>REV <
```

10 Press the Store/Enter key to accept the entry.



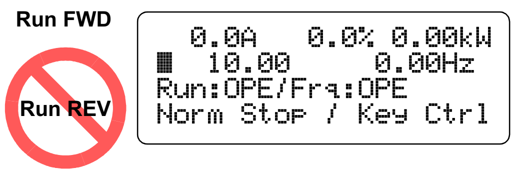
11 Press the Monitor Mode key. The display will prompt you to save the change made in Program Mode to the inverter's EEPROM.



12 Press the Store/Enter key to save the parameter change to the inverter's retentive memory (EEPROM).



13 The inverter will now reflect the restriction setting. If set to 'REV" for example, the inverter will only respond to the Run FWD command.



Note: *The parameter F004 Motor Direction determines the which command (Run FWD or Run REV) the inverter applies when using either the standard Hitachi inverter keypad or the SC-OPE 3H. Changing the sense of direction for network Run commands will require reversing the two of the three motor wires.*

Connecting to a ModBus RTU Network

Overview

Many PLCs are available with built-in ModBus communication protocol. The relay ladder logic (RLL) example in this section uses an arbitrary set of input points, internal relays, registers, etc. for a DirectLogic PLC as a typical example. Therefore, it is not intended for use as-is in an actual application.

When using network control of the inverter, the SC-OPE maps (translates) network commands to specific inverter parameters. When writing your host computer control program, you will need a map of network registers and inverter parameters. Please refer to Appendix D and Appendix E for network register maps.

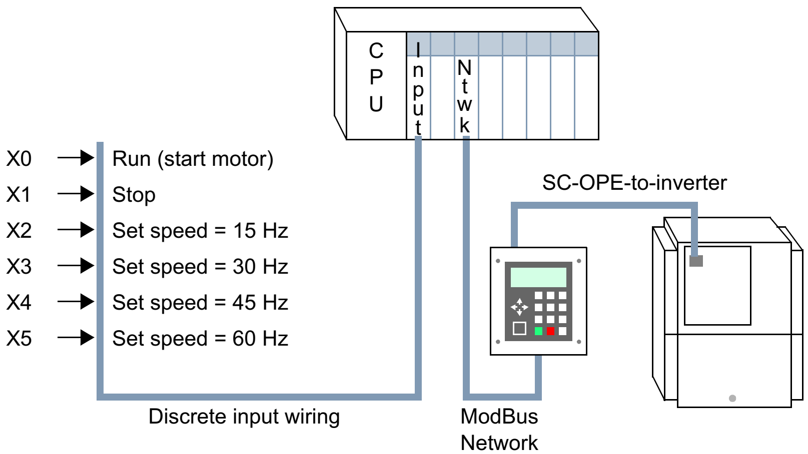


Warning: *Be sure to set up the basic drive parameters* ***before*** *connecting the PLC to the drive and running it. Failure to do this could result in damage to the drive or the equipment connected to the drive.*

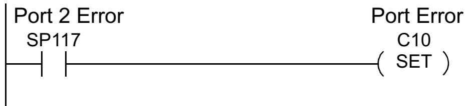


Note: *Remember that the number format of the registers in the drive is decimal, while the number format of the registers in your PLC may be in BCD/HEX. If you are viewing the drive values in a data view window, be sure to select decimal as the format for viewing. If you are writing values to the drive, be sure to change the value to decimal.*

The following block diagram of the PLC controller shows its input switch assignment for the following example program and the resulting inverter command.

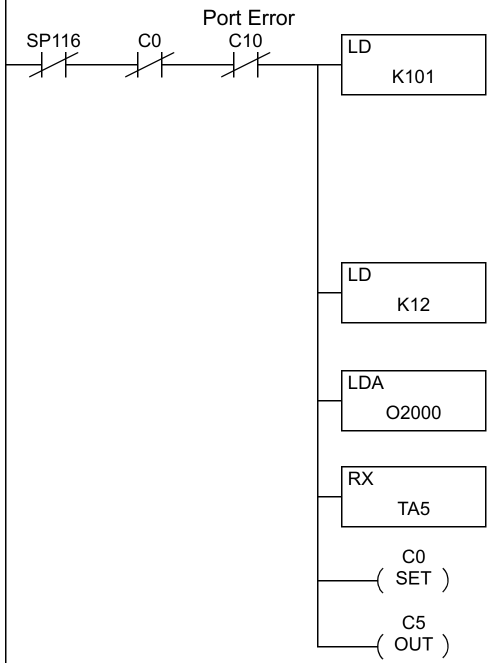


Ladder Program Example for ModBus Comm.



Special relay SP117 reports a communication error between the PLC and the SCOPE (for example, broken cable, etc.)

The following rung moves values from the SC-OPE to PLC memory register V2000.

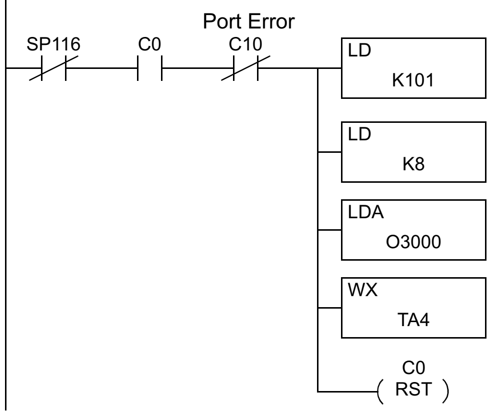


The LD box designates the bottom port of the DirectLogic CPU as master and specifies address 1 as the slave address. The last digit (“1) corresponds to the number of SC-OPEs (devices) on the network.

LD box specifies the amount of data to be read in bytes. K12 specifies 12 bytes or 6 words.

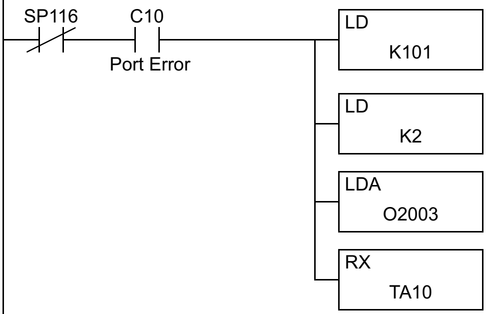
LDA box specifies the destination of the values being read.

Read from TA5 (V5) in the RX operation. The equivalent MODBUS RTU address = 40006.

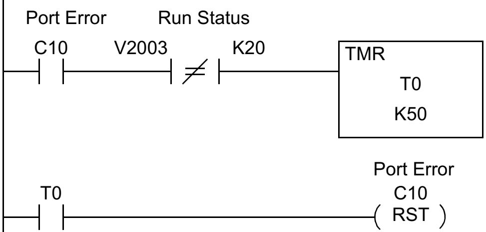


This rung writes values to the SC-OPE. We are loading the values from V3000 in the DL250 CPU and moving them into TA4 (V4). The equivalent MODBUS address = 40005.

The following rung helps to ensure the PLC is reading valid data. It utilizes the fact that if either the comm port of the inverter, the SC-OPE's inverter port, or the cable between the SC-OPE and the drive has a fault (error), the only register that will not fail communications to the PLC is the Run Status register. When a port error occurs we will attempt to read this register. A read failure indicates the problem is between the PLC and SC-OPE. In this event, increment a counter five times and, when the counter is done, turn control relay C34 ON.

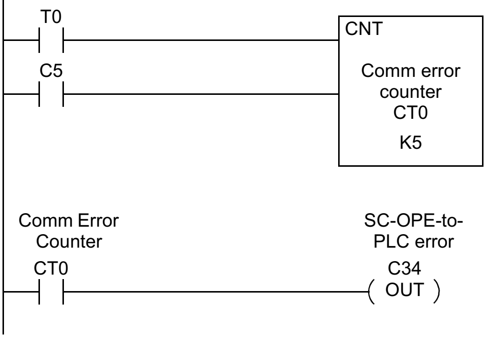


Attempt to read the Run Status register when a port error or communications error occurs.

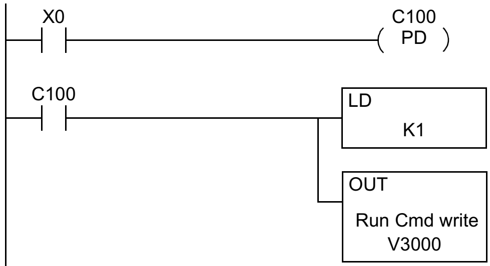


Keep reading the run status register until the comm error clears between the SC-OPE and the Drive. K20 is the value of the run status register when there is an error for SC-OPE-to-inverter communications.

The following rung monitors communications for port errors after attempting to read the run status register.

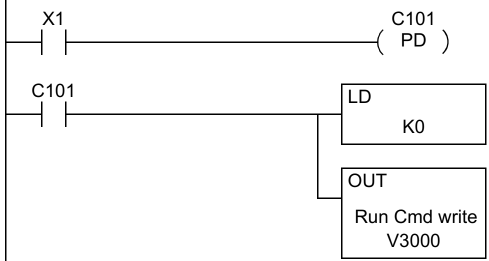


If errors persist, then increment the counter 5 times. When the counter is done, turn control relay C34 ON to record the error for SC-OPE-to-PLC communications. Control relay C5 turns ON once normal communication is resumed to reset the counter.

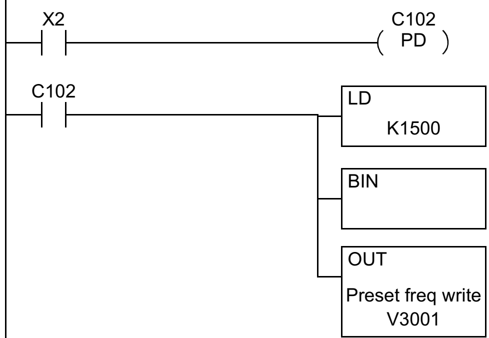


Start the inverter from input X0 by loading the constant K1into V3000 (run command register) of the SC-OPE (K1=FWD, K2=REV).

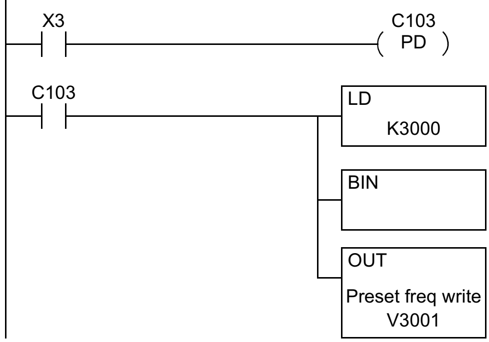
NOTE: This example program uses separate Start and Stop switch inputs. However, it is possible to use the NOT state of X0 to load a zero into the run command register and achieve both start and stop functions with one input switch.



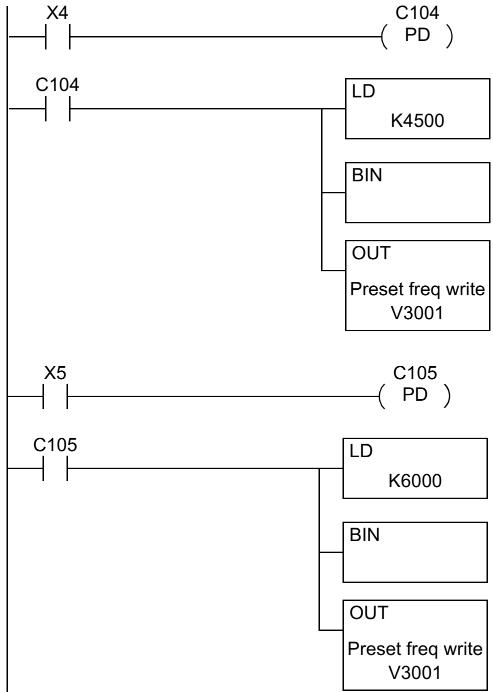
Stop the inverter by loading K0 into V3000, the run command register of the drive.



These next few rungs load different speeds into the Preset Frequency register in the drive. The speed reference resolution is in 0.01 Hz, so a load of K1500 yields 15.00 Hz.



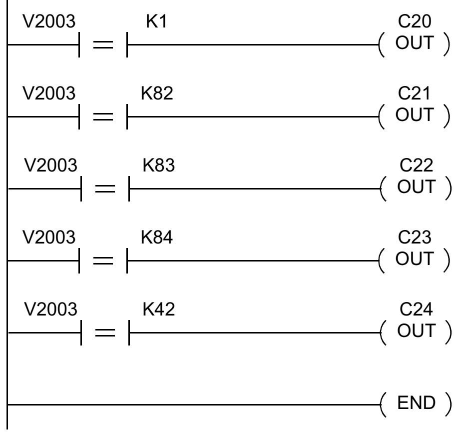
Set the inverter speed to 30 Hz.



Set the inverter speed to 45 Hz.

Set the inverter speed to 60 Hz.

The following rungs implement diagnostic monitoring which you can access from the run status register 40009. The status register consists of bit-level indicators of status events. By viewing the register in binary, you will see that bit 7 is ON when the inverter is running, bit 0 is ON when the inverter is stopped, bit 7 and bit 2 are ON when the inverter is in deceleration. Consult the register map for a detailed explanation on the status register.



Inverter stopped — 82 is the hex equivalent of 130 in decimal

Inverter in deceleration — 83 is the hex equivalent of 131

Inverter at preset frequency — 84 is the hex equivalent of 132

Inverter in acceleration — 84 is the hex equivalent of 132

Inverter in trip — 42 is the hex equivalent of 66

End of program

Connecting to a DirectNet Network

Overview

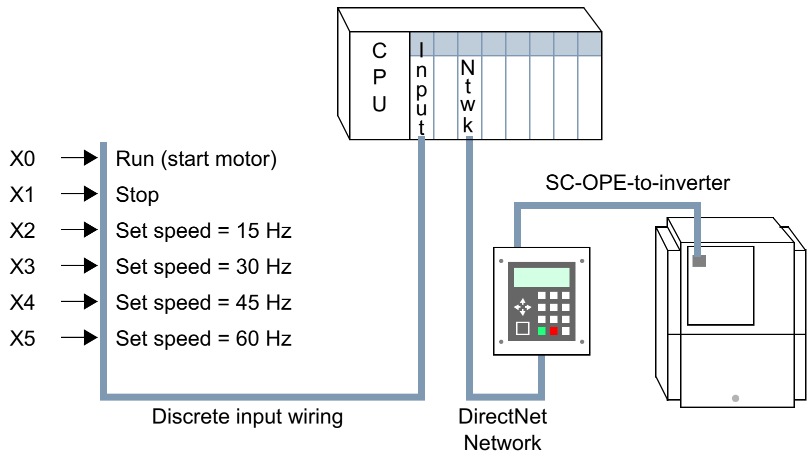
Some PLCs are available with built-in DirectNet communication protocol. The relay ladder logic (RLL) example in this section uses an arbitrary set of input points, internal relays, registers, etc. for a DirectLogic PLC as a typical example. Therefore, it is not intended for use as-is in an actual application.

When using network control of the inverter, the SC-OPE maps (translates) network commands to specific inverter parameters. When writing your host computer control program, you will need a map of network registers and inverter parameters. Please refer to Appendix D and Appendix E for network register maps.

Warning: *Be sure to set up the basic drive parameters* ***before*** *connecting the PLC to the drive and running it. Failure to do this could result in damage to the drive or the equipment connected to the drive.*

Note: *Remember that the number format of the registers in the drive is decimal, while the number format of the registers in your PLC may be in BCD/HEX. If you are viewing the drive values in a data view window, be sure to select decimal as the format for viewing. If you are writing values to the drive, be sure to change the value to decimal.*

The following block diagram of the PLC controller shows its input switch assignment for the following example program and the resulting inverter command.

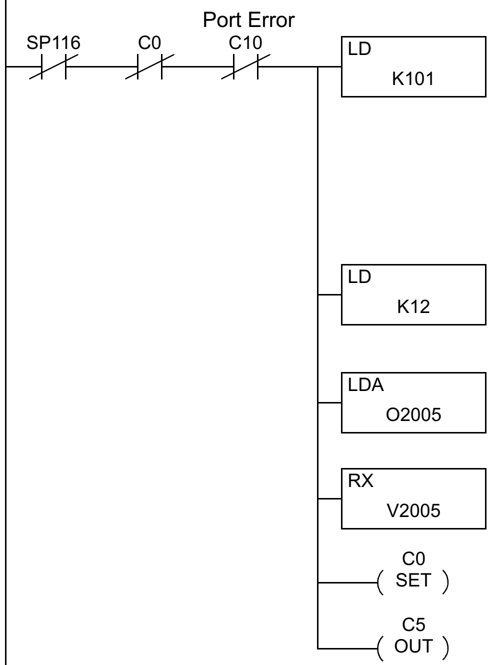


Ladder Program Example for DirectNet Comm.



Special relay SP117 reports a communication error between the PLC and the SCOPE (for example, broken cable, etc.)

The following rung moves values from the SC-OPE to PLC memory register V2000.

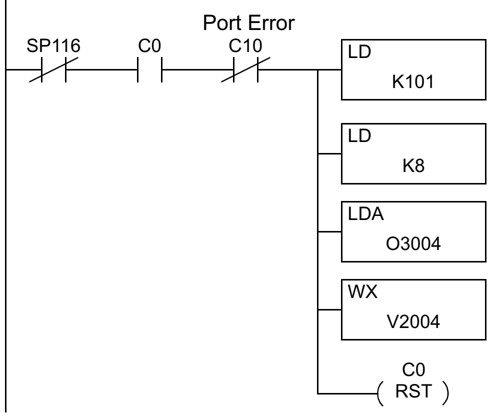


The LD box designates the bottom port of the DirectLogic CPU as master and specifies address 1 as the slave address. The last digit (“1) corresponds to the number of SC-OPEs (devices) on the network.

LD box specifies the amount of data to be read in bytes. K12 specifies 12 bytes or 6 words.

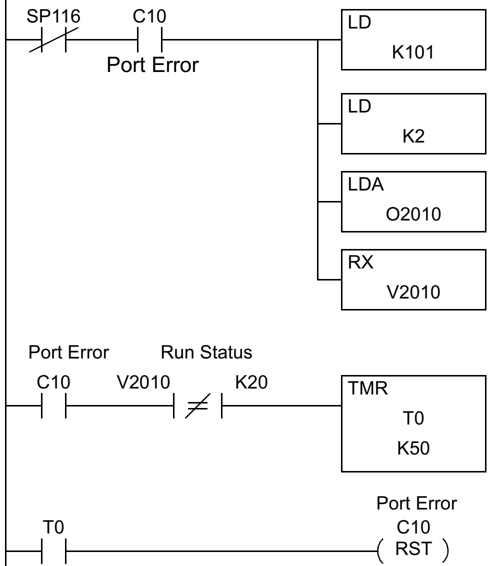
LDA box specifies the destination of the values being read.

Read from V2005 in the RX operation, the preset frequency (according to the register map).



This rung writes values to the SC-OPE. We are loading the values from V3004 in the DL250 CPU and moving them into V2004 in the inverter.

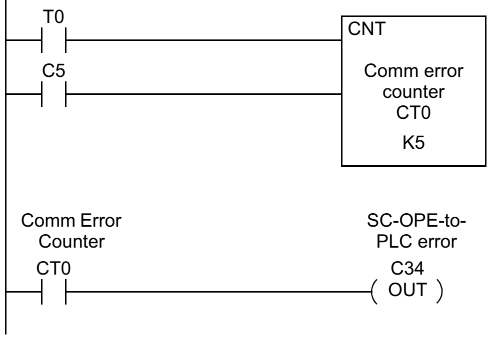
The following rung helps to ensure the PLC is reading valid data. It utilizes the fact that if either the comm port of the inverter, the SC-OPE's inverter port, or the cable between the SC-OPE and the drive has a fault (error), the only register that will not fail communications to the PLC is the Run Status register. When a port error occurs we will attempt to read this register. A read failure indicates the problem is between the PLC and SC-OPE. In this event, increment a counter five times and, when the counter is done, turn control relay C34 ON.



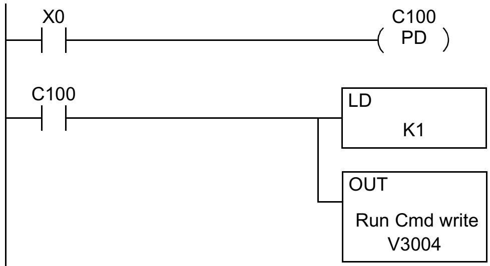
Attempt to read the Run Status register when a port error or communications error occurs.

Keep reading the run status register until the comm error clears between the SC-OPE and the Drive. K20 is the value of the run status register when there is an error for SC-OPE-to-inverter communications.

The following rung monitors communications for port errors after attempting to read the run status register.

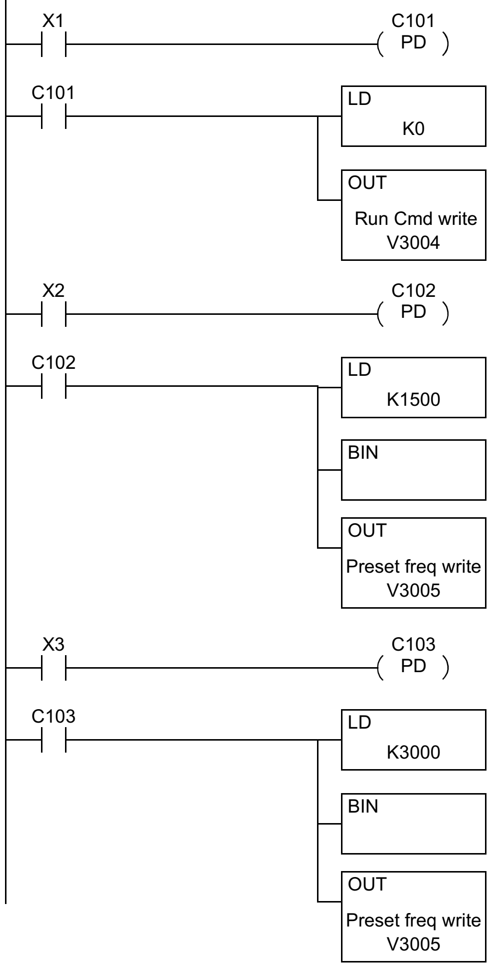


If errors persist, then increment the counter 5 times. When the counter is done, turn control relay C34 ON to record the error for SC-OPE-to-PLC communications. Control relay C5 turns ON once normal communication is resumed to reset the counter.



Start the inverter from input X0 by loading the constant K1into V3004 (run command register) of the SC-OPE (K1=FWD, K2=REV).

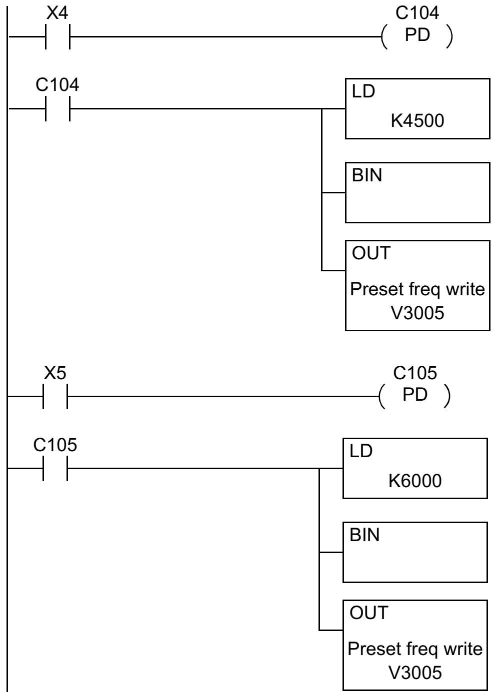
NOTE: This example program uses separate Start and Stop switch inputs. However, it is possible to use the NOT state of X0 to load a zero into the run command register and achieve both start and stop functions with one input switch.



Stop the inverter by loading K0 into V3000, the run command register of the drive.

These next few rungs load different speeds into the Preset Frequency register in the drive. The speed reference resolution is in 0.01 Hz, so a load of K1500 yields 15.00 Hz.

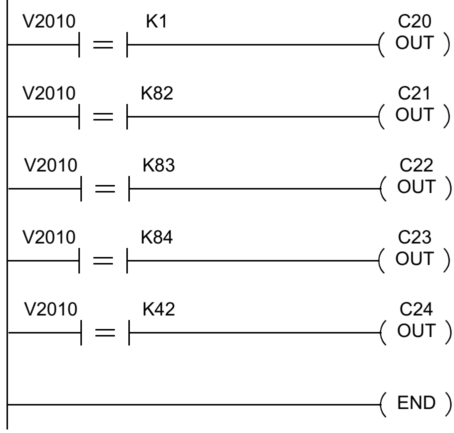
Set the inverter speed to 30 Hz.



Set the inverter speed to 45 Hz.

Set the inverter speed to 60 Hz.

The following rungs implement diagnostic monitoring which you can access from the run status register 40009. The status register consists of bit-level indicators of status events. By viewing the register in binary, you will see that bit 7 is ON when the inverter is running, bit 0 is ON when the inverter is stopped, bit 7 and bit 2 are ON when the inverter is in deceleration. Consult the register map for a detailed explanation on the status register.



Inverter stopped — 82 is the hex equivalent of 130 in decimal

Inverter in deceleration — 83 is the hex equivalent of 131

Inverter at preset frequency — 84 is the hex equivalent of 132

Inverter in acceleration — 84 is the hex equivalent of 132

Inverter in trip — 42 is the hex equivalent of 66

End of program

Connecting to an Allen-Bradley DF1 Network

The SC-OPE 3H includes the Allen-Bradley DF1 protocol. The SLC500 PLC family PLCs feature this network connection option. You can connect multiple inverters to a DF1 network, each inverter having its own network address. The example in this section covers the network configuration settings of a SLC500 PLC. RSLogix 500 is the programming software for the SLC500 family.

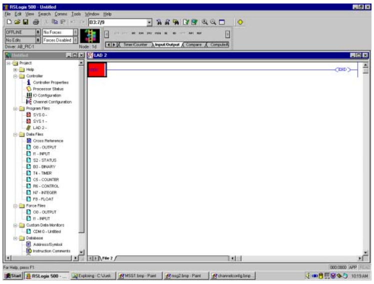
DF1 network configuration consists of these steps:

- Channel configuration
- Adding an MSG instruction for each network transaction in the ladder program
- Configuring the setup screen within each MSG instruction

Channel Configuration

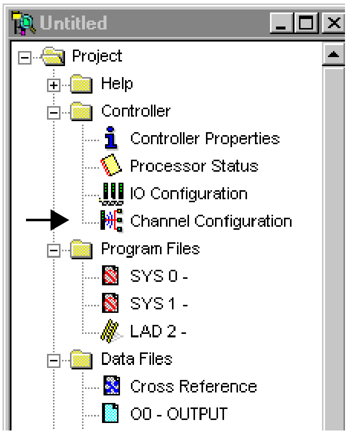
To configure the communications channel in a project:

1 In the RSLogix software, click File > New to begin a new project.

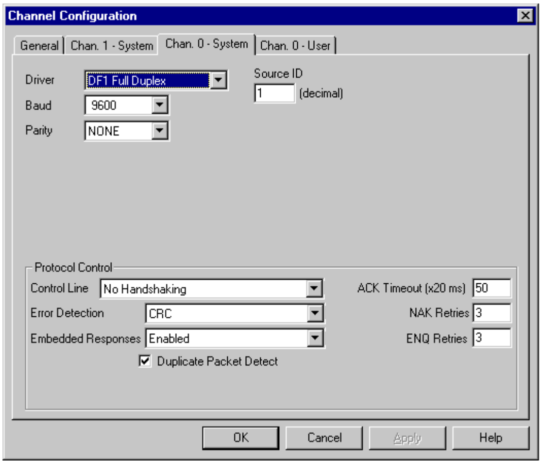


2 Click File > Save As... to name the project at this time.

3 Refer to the project element explorer pane to the left of the RSLogix window. In the Controller folder, double click the Channel Configuration item as shown. Then the Channel Configuration dialog will appear.



The remaining steps in this sequence refer to the Channel Configuration dialog below.



4 For the Driver setting, select “DF1 Full Duplex.”

5 Leave the Source ID setting at “1.”

6 In the Protocol Group, set the Control Line field to “No Handshaking.”

7 Set the Error Detection field to “CRC.”

8 Set the Embedded Responses field to “Enabled.”

9 Click (enable) the Duplicate Packet Detect check box.

MSG Instruction

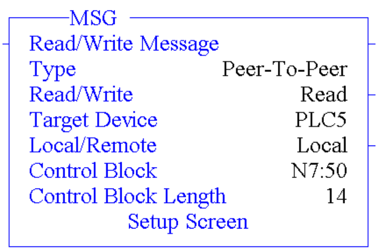
The ladder program in your project will need an MSG instruction for each communications transaction with each inverter on the DF1 network.

To configure an MSG instruction for inverter communications:

1 In RSLogix, use the Input/Output instruction list to find the MSG instruction.

2 Insert the MSG instruction in your ladder program. Remember to include logic to ensure the MSG instruction executes only when needed (and not on each scan).

3 In the Type field, choose “Peer-to-Peer.”



4 In the Read/Write field, select "Read" to read data from the inverter, or "Write" to write data to the inverter via the SC-OPE.

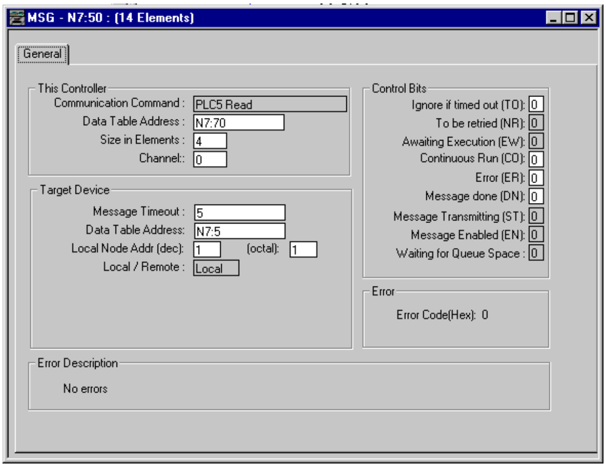
5 In the Target Device field, select "PLC5." The SC-OPE's DF1 protocol uses the PLC5 type.

6 In the Local/remote field, choose "Local."

The MSG instruction includes an embedded setup screen for data not shown directly in the ladder program.

To configure the Setup Screen for each MSG instruction:

1 Double click "Setup Screen" at the bottom of the MSG instruction block.



2 In the General tab of the MSG dialog box, refer to the This Controller group. In the Data Table Address field, select the area of PLC memory to use in the read/write transaction with the inverter.

3 In the Size in Elements field, enter the number of data words (16-bit items) to read or write.

4 In the Channel field, select "0."

5 The Target Device Group contains settings for the SC-OPE. In the Data Table Address field, enter the starting register address for the inverter data to be read or written. In this example, the following registers will be read:

Address	Data Contents
N7:5	Preset Frequency
N7:6	Acceleration Time
N7:7	Deceleration Time
N7:8	Run Status

6 In the Local Node Addr (dec) field, enter the node address (in decimal) of the targeted SC-OPE on the network for this MSG instruction.

When using network control of the inverter, the SC-OPE maps (translates) network commands to specific inverter parameters. When writing your host computer control program, you will need a map of network registers and inverter parameters. Please refer to Appendix D and Appendix E for network register maps.

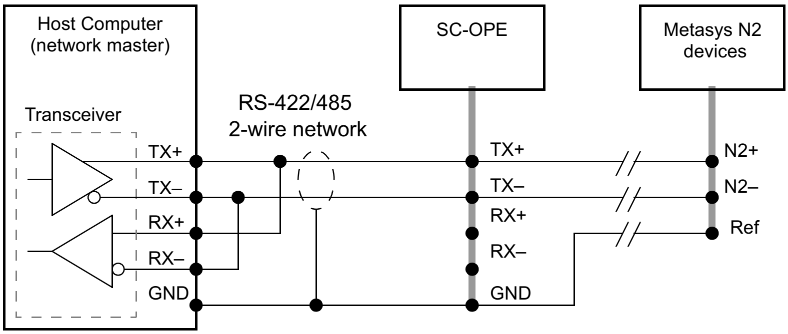
Note: *For help in creating the ladder program for your application, please refer to your Allen-Bradley PLC documentation or distributor support.*

Connecting to a Metasys N2 Network

The SC-OPE 3H can provide an interface for Hitachi SJ300 / L300P inverters to Johnson Controls' Metasys N2 network. Metasys N2 is a building automation network used for HVAC, power management, security, etc.

Physical Bus Connections

The connections for the N2 Network are located on the network port connector at the bottom of the SC-OPE 3H. The diagram below shows the connections from the SC-OPE to a MetasysN2 network, which is the 2-wire type.



Remember to add a termination resistor at each physical end of the network, or verify that the device at the end has internal termination. Bias resistors are also important. See "Network Termination" on page 4–8.

SC-OPE 3H Implementation Notes for N2

The following list describes the SC-OPE 3H communications behavior on Metasys N2 networks.

- The overriding of AI and BI points is not supported. Overrides of AI and BI points will be acknowledged. However, the Override Value will be ignored and the Override Flag will not be set.
- Out-of-range values on overrides of AO, ADI, and ADF points will receive a negative acknowledge (NAK) response).

- Certain ADI and ADF points contain read-only values and cannot be overridden. These particular points are noted in the following Point Table. Overrides of these ADI and ADF points will be acknowledged but the Override Value will be ignored and the Override Flag will not be set.

- When an override is released, the point value will remain at the current Override Value and will not revert back to its value prior to the override. This rule applies to all point types.

The appendices contain a network point list for Johnson Controls Metasys N2. See “SJ300 and L300P Building Network Register Maps” on page D–18.

Troubleshooting and Diagnostics

5

In This Chapter. . . . page

- Basic Troubleshooting 2
- Troubleshooting SC-OPE/Inverter Control Inputs 4
- Performing SC-OPE Diagnostics 6

Basic Troubleshooting

The following list provides general troubleshooting tips:

- When changing inverter parameters or configuring the SC-OPE, verify the effect of each adjustment as it is made. If too many adjustments are made before checking for proper operation, it may be very difficult to determine the cause of a sudden problem.
- If and when a problem arises, try to determine the most recent change made to the system. It may have been a parameter value change, wiring change, etc. Examine the latest change(s) for errors, or restore the most recent known working system configuration.
- When it is difficult to narrow the problem down to a single component, try substituting a spare part (SC-OPE, cable, etc.) for the most likely problem component.
- Load a known working set of parameters from one inverter to the problem inverter (via the SC-OPE as a copy unit).
- Substitute a simpler method of operation. For example, if network control is not working, try keypad control. If the speed control potentiometer input does not work, verify that the speed control register (F001) method does work. If the simpler method of operation does not work, the more complex method has little chance of working.
- Troubleshooting a new application is different from troubleshooting a system that is already installed and was once working. For new applications, it is important to follow the installation instructions step by step (for the inverter and for the SC-OPE).
- For an existing application that has stopped working, check for simple things likely to interrupt proper operation — such as input power, a changed Hand/Auto mode on the SC-OPE, a loose cable or wiring terminal, a missing input signal from another system, etc.

Basic Symptoms

The following table lists basic symptoms and possible causes and solutions. More detailed troubleshooting tips are in the next section.

Symptom	Possible Causes and Solutions
SC-OPE display is blank and its Power LED is OFF	Inverter power is OFF. Check input power, circuit breakers or fuses, or cutoff switches.
	Cable from SC-OPE to inverter is loose. Check the connections at each end of the cable.
	Inspect the RJ45 modular jacks for damage (one on the inverter, one on the SC-OPE), which the communications cable uses.
	The cable from SC-OPE to inverter may be defective. Substitute a new cable.
	If you suspect the SC-OPE may be defective, replace it with the original inverter keypad or another known working SC-OPE.
SC-OPE display output has changed from its normal output for normal operation.	Perhaps another person or event changed the mode or state of the SC-OPE. As a starting point, you can reset the SC-OPE to its powerup state by pressing and holding the MODE key for 6 seconds.
SC-OPE was operating under network control (Net Ctrl), but somehow the SC-OPE has changed to keypad control (Key Ctrl)	If the SC-OPE is configured to change from network control to keypad control via the Stop key, a Stop key press event may have caused the exit from network control. Manual intervention will be necessary to return the SC-OPE to network control. See “Selecting Keypad or Network Control” on page 3–4.
Error code is displayed	The inverter has probably tripped due to over-current, over-voltage, etc. Refer to the inverter manual for interpreting error codes. Press the STOP key to clear the error from the display.
Motor does not move upon a Run command	Speed input may be zero. This may be confirmed by viewing the contents of parameter F001 (via Monitor Mode). If sourced externally, also check input terminals or network command operation, etc.
	The Run command may not be reaching the inverter. This may be confirmed by checking the Run LED on the SC-OPE keypad.

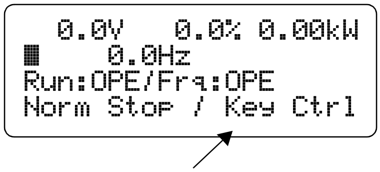
Troubleshooting SC-OPE/Inverter Control Inputs

Keypad versus Network Control

The inverter is always either under SC-OPE keypad or network control. That is, the SC-OPE is configured either to send commands from its keypad, or to pass control commands through from an attached network. Press the Monitor Mode key to view which setting is in effect. See “Selecting Keypad or Network Control” on page 3–4.

When using keypad control:

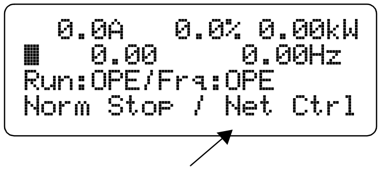
- The Run command and Frequency Setting sources *must* be set to come from the keypad... Run:OPE/Frq:OPE.



Control source = SC-OPE Keypad

When using network control:

- For network control to operate, either or both the Run Source and Frequency Source settings must be “OPE.” A configuration of Run:TRM/Frq:TRM *will not* follow the network commands.



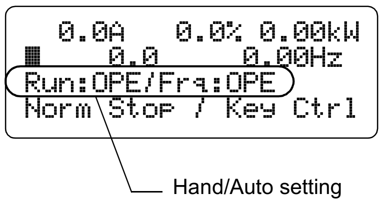
Control source = Network

- You can choose the SC-OPE’s response to the Stop Key — whether there is no action, or whether it will change the SC-OPE control source setting from Network Control to Keypad Control. See “SC-OPE Network Configuration” on page 4–12.

Tip: *If you are having difficulty getting network control to work, try using keypad control to verify that you can get the motor turning. It is easier to troubleshoot more basic problems by using the SC-OPE keypad.*

Run Command and Speed Setting Sources

Getting the inverter and motor to respond depends on several factors, but primarily inverter input power, a working Run command source, and a non-zero speed (output frequency) reference. The inverter can be configured to accept a Run command from one of several sources; the same is true for the speed setting. This flexibility can make troubleshooting difficult, but the SC-OPE’s Monitor Mode can help you determine these respective settings. In Monitor Mode, use the Hand/Auto key to change these settings to match the actual sources your system provides for the inverter. See “Hand/Auto Key Operation” on page 3–30.



After verifying the Run command source and Speed Setting source are correct, use the following table if the inverter/motor still does not respond.

<table>
<tr><th>Symptom</th><th>Related Configurations and Solutions</th></tr>
<tr><td rowspan="2">No Run Command
Run command does not cause motor to turn or engage (Run LED is OFF)</td><td>If the inverter is configured to expect the Run command from the input terminals (Run:TRM):
• Ensure one of the intelligent inputs is programmed for the appropriate FWD or REV function.
Note: The SJ300/L300P inverters have a built-in [FWD] terminal.
• Use a digital voltmeter (DVM) to measure the voltage at the [FWD] or [REV] terminal when the Run command is active and inactive.</td></tr>
<tr><td>If you are using the SC-OPE keypad as the Run command source (Run:OPE):
• You can test the keypad keys individually. See “Keypad and LED Diagnostics” on page 5–7.
• The [REV] key may be independently disabled via the SC-OPE configuration. See “Limiting the Direction of Rotation” on page 4–15.</td></tr>
<tr><td rowspan="3">No Frequency Setting
Run command causes Run LED to turn ON, but motor does not turn</td><td>If you are using the SC-OPE keypad (Frq:OPE) to edit the output frequency (F001) directly:
• Use Monitor Mode to verify the value of F001 (on second line of display). If it is zero, use the Change Data key and Arrow keys to change the value.
• Check the value of the maximum output frequency.</td></tr>
<tr><td>If the output frequency setting comes from the analog input terminals (Frq:TRM):
• Use a digital voltmeter (DVM) to verify the input voltage and polarity, or current and direction at the terminals.
• Check the value of the maximum output frequency.</td></tr>
<tr><td>If the output frequency source is set to come from the keypad potentiometer (Frq:VM):
• Note that the Frq:VM setting requires the use of the original Hitachi keypad (with potentiometer) to set the output frequency for this configuration. For SC-OPE use, do not set the frequency source to FRQ:VM.</td></tr>
</table>

Performing SC-OPE Diagnostics

The Configuration Menu in the SC-OPE features a Diagnostics Mode. You can perform diagnostics to verify proper keypad operation, LED indicator illumination, and network port operation. The network port check assumes a loopback connection exists. In order to pass the network port part of the diagnostics, you must install the loopback connection. However, you can perform diagnostics on the keypad keys without installing a loopback connector — but the network port test will fail.

Network Port Loopback Test

To prepare a loopback connector for the network port (RS422/485):

1 Find the connector plug in the Bezel Kit to install jumper wires for the loopback.



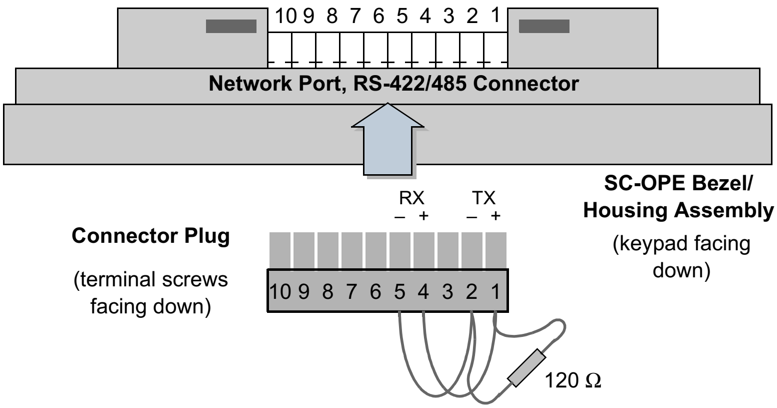
Caution: *Use insulated wire (not bare wire) for the loopback jumpers. Otherwise, a short circuit may develop.*

2 Connect TX+ (terminal 1) to RX+ (terminal 4)

3 Connect TX– (terminal 2) to RX– (terminal 5)

4 Connect a termination resistor (120 Ω) from TX+ (terminal 1) to TX– (terminal 2)

5 Insert the connector plug into the SC-OPE network port connector.

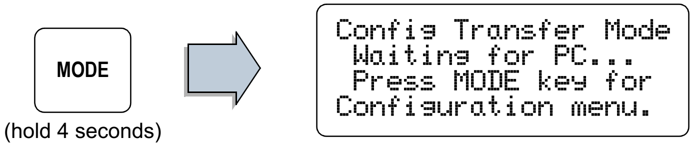


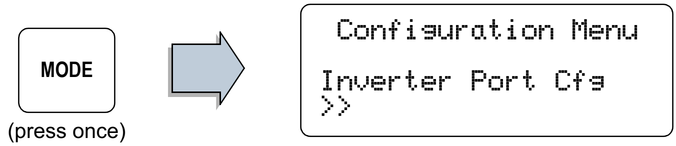
Loopback Configuration

Keypad and LED Diagnostics

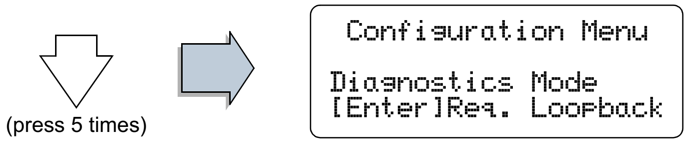
To perform SC-OPE keypad and LED diagnostics:

1 Access the Configuration Menu, using the Mode key as shown.

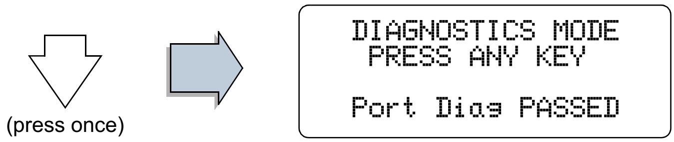




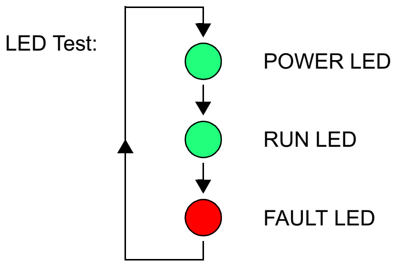
2 Scroll down the Configuration Menu list with the Down Arrow key as shown until you reach the Diagnostics Mode menu item.



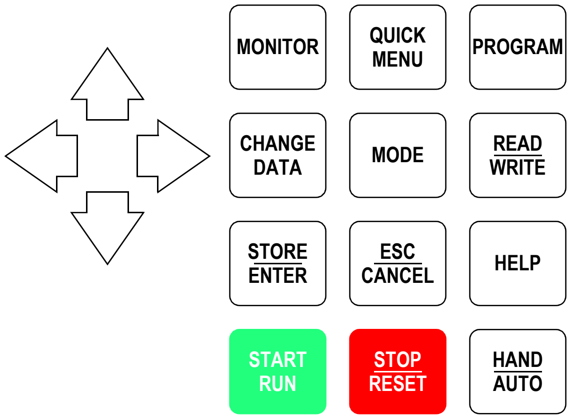
3 Press [Enter] to enter the Diagnostics Mode. The network serial port test occurs immediately and the result is given on the display's bottom line.



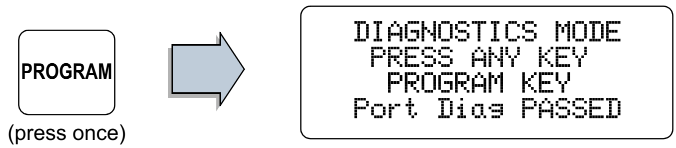
4 Observe that the three LEDs are flashing ON repeatedly in the sequence:



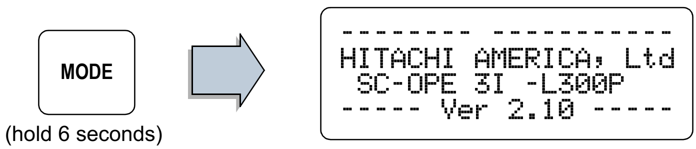
5 The keypad test is operator-driven. When you press any key shown below, the display prints the name of that key for verification.



For example, press the Program key to display its name on the third display line.



6 Returning to normal SC-OPE operation requires you to reset the SC-OPE. Press and hold the Mode key for 6 seconds; release it when the Startup Screen displays.



SJ300 / L300P Program Menu List

A

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• SJ300 / L300P Inverter Program Menu List 2

SJ300 / L300P Inverter Program Menu List

Note: *Parameters with an asterisk (*) are available only on the SJ300 (not L300P).*

Monitor Vars	➤	➤ Var 1.1	
		▼ Var 1.2	
		▼ Var 1.3	
		▼ Var 2	
Parameters	➤ **Initial**	➤ Initialize Mode	B084
		▼ Country Code	B085
		▼ Reintialize Drive	
		▼ Debug Mode Sel	C091
		▼ Run Key Routing	F004
	▼ **Base Settings**	➤ Freq Set Method	A001
		▼ Run Set Method	A002
		▼ Base Frequency	C03
		▼ 2nd Base Freq	A203
		▼ 3rd Base Freq	A303 *
		▼ Max Frequency	A004
		▼ 2nd Max Freq	A204
		▼ 3rd Max Freq	A304 *
		▼ AVR Selection	A081
		▼ Motor Voltage	A082
		▼ Carrier Freq	B083
	▼ **Speed/Jogging**	➤ Multi-Speed Sel	A019
		▼ Multi-Speed 0	A020
		▼ 2nd Multi-Spd 0	A220
		▼ 3rd Multi-Spd 0	A320
		▼ Multi-Speed 1	A021
		▼ Multi-Speed 2	A022
		▼ Multi-Speed 3	A023
		▼ Multi-Speed 4	A024

			▼ Multi-Speed 5	A025
			▼ Multi-Speed 6	A026
			▼ Multi-Speed 7	A027
			▼ Multi-Speed 8	A028
			▼ Multi-Speed 9	A029
			▼ Multi-Speed 10	A030
			▼ Multi-Speed 11	A031
			▼ Multi-Speed 12	A032
			▼ Multi-Speed 13	A033
			▼ Multi-Speed 14	A034
			▼ Multi-Speed 15	A035
			▼ Jogging Freq	A038
			▼ Jogging Mode	A039
	▼ V/F Character		➤ Torq Boost Sel"	A041
			▼ 2nd Torq Boost"	A241
			▼ Man Torq Boost"	A042
			▼ 2nd Man Boost",	A242
			▼ 3rd Man Boost",	A342 *
			▼ Man Boost Point	A043
			▼ 2nd Man Point",	A243
			▼ 3rd Man Point",	A343
			▼ 1st Ctrl Method	A044
			▼ 2nd Ctrl Method	A244
			▼ 3rd Ctrl Method	A344 *
			▼ Outpt Volt Gain	A045
	▼ DC Braking		➤ DCB Selection	A051
			▼ DCB Frequency	A052
			▼ DCB Delay Time	A053
			▼ DCB Power	A054
			▼ DCB Time	A055
			▼ DCB Edge/Level	A056
			▼ DCB Pwr Strt T	A057
			▼ DCB Tim Strt T	A058
			▼ DCB Carrier Frq	A059

Group	Function	Code
▼ Braking Ctrl	➤ Brake Ctrl Sel	B120 *
	▼ Wait Tm Release	B121 *
	▼ Wait Time Accel	B122 *
	▼ Wait Time Stop	B123 *
	▼ Wait Time Signl	B124 *
	▼ Release Freq	B125 *
	▼ Release Current	B126 *
▼ PID Control	➤ PID Selection	A071
	▼ PID P Gain	A072
	▼ PID I Gain	A073
	▼ PID D Gain	A074
	▼ PID Scale	A075
	▼ PID Feedbak Sel	A076
	▼ PID Deviation	C044
▼ BRD	➤ BRD Use Rate	B090
	▼ BRD Select	B095
	▼ BRD On Level	B096
▼ Operation	➤ Oper Mode Sel	A085
	▼ Energy-Save Adj	A086
	▼ 1st 2-Stage Adj	A094
	▼ 2nd 2-Stage Adj	A294
	▼ Start Reduced V	B036
	▼ Start Freq Adj	B082
	▼ Up/Down Select	C101
	▼ Reset Selection	C102
	▼ Reset Frq Match	C103
	▼ Running Direct.	F004

	▼ Free V/F		➤ Free V/F Freq 1	B100
			▼ Free V/F Volt 1	B101
			▼ Free V/F Freq 2	B102
			▼ Free V/F Volt 2	B103
			▼ Free V/F Freq 3	B104
			▼ Free V/F Volt 3	B105
			▼ Free V/F Freq 4	B106
			▼ Free V/F Volt 4	B107
			▼ Free V/F Freq 5	B108
			▼ Free V/F Volt 5	B109
			▼ Free V/F Freq 6	B110
			▼ Free V/F Volt 6	B111
			▼ Free V/F Freq 7	B112
			▼ Free V/F Volt 7	B113
	▼ Accel		➤ 1st Accel Time	F002
			▼ 2nd Accel Time	F202
			▼ 3rd Accel Time	F302 *
			▼ 1st Accel Time2	A092
			▼ 2nd Accel Time2	A292
			▼ 3rd Accel Time2	A392 *
			▼ 1st Acc Freq 2	A095
			▼ 2nd Acc Freq 2	A295
			▼ Accel Pattern	A097
			▼ Acc Curve Const	A131
	▼ Decel		➤ 1st Decel Time	F003
			▼ 2nd Decel Time	F203
			▼ 3rd Decel Time	F303 *
			▼ 1st Decel Time2	A093
			▼ 2nd Decel Time2	A293
			▼ 3rd Decel Time2	A393 *
			▼ 1st Dec Freq 2	A096
			▼ 2nd Dec Freq 2	A296
			▼ Decel Pattern	A098
			▼ Dec Curve Const	A132

	▼ **Protection**	➤ **E-Thermal**	➤ E-Therm Level	B012
			▼ 2nd E-Thm Level	B212
			▼ 3rd E-Thm Level	B312 *
			▼ 1st E-Thm Char	B013
			▼ 2nd E-Thm Char	B213
			▼ 3rd E-Thm Char	B313 *
			▼ E-Thm Freq 1	B015
			▼ E-Thm Current 1	B016
			▼ E-Thm Freq 2	B017
			▼ E-Thm Current 2	B018
			▼ E-Thm Freq 3	B019
			▼ E-Thm Current 3	B020
			▼ Thermal Warning	C061
		▼ **Overload**	➤ OLoad Method	B021
			▼ OLoad Level	B022
			▼ OLoad Const	B023
			▼ OLoad Method 2	B024
			▼ OLoad Level 2	B025
			▼ OLoad Const 2	B026
			▼ Adv Notice Mode	C040
			▼ Adv Level OL	C041
			▼ Adv Level OL2	C111 *
		▼ **Frequency**	➤ 1st Frq Upr Lmt	A061
			▼ 2nd Frq Upr Lmt	A261
			▼ 1st Frq Lwr Lmt	A062
			▼ 2nd Frq Lwr Lmt	A262
			▼ Jump Freq 1	A063
			▼ Jump Width 1	A064
			▼ Jump Freq 2	A065
			▼ Jump Width 2	A066
			▼ Jump Freq 3	A067
			▼ Jump Width 3	A068
			▼ Accel Stop Freq	A069
			▼ Accel Stop Time	A070

▼ **IPF Restart**	➤ Retry Selection	B001	
	▼ Failure Time	B002	
	▼ Retry Wait Time	B003	
	▼ Trip During Stp	B004	
	▼ Retry Time Sel	B005	
	▼ Open-Phase Sel	B006	
	▼ Freq Set Match	B007	
	▼ N-Stop IPF Sel	B050	*
	▼ N-Stop Strt Vlt	B051	*
	▼ OV-LAD Stop Lvl	B052	*
	▼ IPF Decel Time	B053	*
	▼ IPF Decel Width	B054	*
	▼ Resume FRS Mode	B088	
	▼ Stop Mode Sel	B091	
▼ **Torque Limit**	➤ Torq Limit Sel	B040	*
	▼ Torq Limit1 F-D	B041	*
	▼ Torq Limit2 R-R	B042	*
	▼ Torq Limit3 R-D	B043	*
	▼ Torq Limit4 F-R	B044	*
	▼ Torq LADSTP Sel	B045	*
▼ **Thermistor**	➤ Thermistor Sel	B098	
	▼ Therm Err Level	B099	
	▼ Thermistor Adj	C085	
▼ **Other**	➤ Dir. Restrict	B035	
	▼ Rev Run Prevent	B046	*
	▼ SW Lock Mode	B031	
	▼ Stop Key Enable	B087	
	▼ Cool Fan Ctrl	B092	
	▼ Debug Mode Sel	C091	

	▼ **Terminal**	➤ **Input Defs**	➤ Input Term 1"	C001
			▼ Input Term 2"	C002
			▼ Input Term 3"	C003
			▼ Input Term 4"	C004
			▼ Input Term 5"	C005
			▼ Input Term 6"	C006 *
			▼ Input Term 7"	C007 *
			▼ Input Term 8"	C008 *
		▼ **Input States**	➤ Input 1 NO/NC	C011
			▼ Input 2 NO/NC	C012
			▼ Input 3 NO/NC	C013
			▼ Input 4 NO/NC	C014
			▼ Input 5 NO/NC	C015
			▼ Input 6 NO/NC	C016 *
			▼ Input 7 NO/NC	C017 *
			▼ Input 8 NO/NC	C018 *
			▼ Inp FWD NO/NC	C019
		▼ **Analog Input**	➤ AT Term Select	A005
			▼ O2 Term Select	A006
			▼ O Start Freq	A011
			▼ O End Freq	A012
			▼ O Start Rate	A013
			▼ O End Rate	A014
			▼ O Start Select	A015
			▼ Sampling Number	A016
			▼ OI Start Freq	A101
			▼ OI End Freq	A102
			▼ OI Start Rate	A103
			▼ OI End Rate	A104
			▼ OI Start Select	A105
			▼ O2 Start Freq	A111
			▼ O2 End Freq	A112
			▼ O2 Start Rate	A113
			▼ O2 End Rate	A114

		▼ **Analog Meter**	➤ AM Adjustment	B080
			▼ FM Adjustment	B081
			▼ O Adjustment	C081
			▼ OI Adjustment	C082
			▼ O2 Adjustment	C083
			▼ AM Offset Adj	C086
			▼ AMI Adjustment	C087
			▼ AMI Offset Adj	C088
			▼ O Zero Adjust	C121
			▼ OI Zero Adjust	C122
			▼ O2 Zero Adjust	C123
		▼ **Output Defs**	➤ Output Term 11	C021
			▼ Output Term 12	C022
			▼ Output Term 13	C023 *
			▼ Output Term 14	C024 *
			▼ Output Term 15	C025 *
			▼ Alarm Output	C026
			▼ FM Selection	C027
			▼ AM Selection	C028
			▼ AMI Selection	C029
		▼ **Output States**	➤ Output 11 NO/NC	C031
			▼ Output 12 NO/NC	C032
			▼ Output 13 NO/NC	C033 *
			▼ Output 14 NO/NC	C034 *
			▼ Output 15 NO/NC	C035 *
			▼ Alarm Out NO/NC	C036
		▼ **Output Levels**	➤ RNT/ONT Level	B034
			▼ Accel Arv Freq	C042
			▼ Decel Arv Freq	C043
			▼ 2nd Accel Arv F	C045 *
			▼ 2nd Decel Arv F	C046 *
			▼ F-D Over Torq	C055 *
			▼ R-R Over Torq	C056 *
			▼ R-D Over Torq	C057 *

	▼ F-R Over Torq	C058 *
	▼ Alarm Code Sel	C062 *
	▼ 0 Speed Detect	C063 *
▼ **Motor Settings**	➤ Autotuning Sel	H001 *
	▼ 1st Const Sel	H002 *
	▼ 2nd Const Sel	H202 *
	▼ 1st Allow Sel	H003
	▼ 2nd Allow Sel	H203
	▼ 1st Mtr Pol Sel	H004
	▼ 2nd Mtr Pol Sel	H204
	▼ 1st Speed Resp	H005 *
	▼ 2nd Speed Resp	H205 *
	▼ 1st Stab Factor	H006
	▼ 2nd Stab Factor	H206
	▼ 3rd Stab Factor	H306 *
	▼ 1st Const R1	H020 *
	▼ 2nd Const R1	H220 *
	▼ 1st Const R2	H021 *
	▼ 2nd Const R2	H221 *
	▼ 1st Const L	H022 *
	▼ 2nd Const L	H222 *
	▼ 1st Const Io	H023 *
	▼ 2nd Const Io	H223 *
	▼ 1st Const J	H024 *
	▼ 2nd Const J	H224 *
	▼ 1st Const R1 AT	H030 *
	▼ 2nd Const R1 AT	H230 *
	▼ 1st Const R2 AT	H031 *
	▼ 2nd Const R2 AT	H231 *
	▼ 1st Const L AT	H032 *
	▼ 2nd Const L AT	H232 *
	▼ 1st Const Io AT	H033 *
	▼ 2nd Const Io AT	H233 *
	▼ 1st Const J AT	H034 *
	▼ 2nd Const J AT	H234 *

▼ **P/PI Switching**	➤ 1st PI Pro Gain	H050 *
	▼ 2nd PI Pro Gain	H250 *
	▼ 1st PI Int Gain	H051 *
	▼ 2nd PI Int Gain	H251 *
	▼ 1st P Pro Gain	H052 *
	▼ 2nd P Pro Gain	H252 *
	▼ 1st 0Hz-SLV Lmt	H060 *
	▼ 2nd 0Hz-SLV Lmt	H260 *
	▼ PI Pro Gain Sw	H070 *
	▼ PI Int Gain Sw	H071 *
	▼ P Pro Gain Sw	H072 *
▼ **Option**	➤ Opt 1 Err Sel	P001
	▼ Opt 2 Err Sel	P002
	▼ Feedbck Opt Sel	P010 *
	▼ Encdr Pulse Set	P011 *
	▼ Ctrl Mode Sel	P012 *
	▼ Pulse Train Sel	P013 *
	▼ Orient Stop Pos	P014 *
	▼ Orient Spd Set	P015 *
	▼ Orient Dir Sel	P016 *
	▼ Orient Comp Rng	P017 *
	▼ Orient Comp Dly	P018 *
	▼ Gear Pos Select	P019 *
	▼ Gear Numerator	P020 *
	▼ Gear Denominatr	P021 *
	▼ Pos Fwd Gain	P022 *
	▼ Pos Loop Gain	P023 *
	▼ Comp 2nd Res	P025 *
	▼ OverSpeed Level	P026 *
	▼ SpeedErr Level	P027 *
	▼ Acc/Dec Select	P031
	▼ P-Set Select	P032 *
	▼ Frq During Snap	P050 *

	▼ **Communications**	➤ Data Command	C070
		▼ Baud Rate	C071
		▼ Address Code	C072
		▼ Data Bits	C073
		▼ Parity	C074
		▼ Stop Bits	C075
		▼ Waiting Time	C078
Status	➤ **Monitor Values**	➤ Current Freq	D001
		▼ Output Cur (A)	D002
		▼ Rotation Dir.	D003
		▼ PID Feedback	D004
		▼ Inp. Terminals	D005
		▼ Out. Terminals	D006
		▼ Freq Multiplier	B086
		▼ Scaled Freq	D007
		▼ Torque	D012
		▼ Output Voltage	D013
		▼ kW Power	D014
		▼ Accum Run Time	D016
		▼ Power On Time	D017
		▼ Input Voltage	
		▼ P-N Voltage	
	▼ **Operation Status**	➤ Status Byte 1	
		▼ Status Byte 2	
		▼ Status Byte 3	
		▼ Status Byte 4	
	▼ **Frequency Status**	➤ VM Freq Set	
		▼ TRM Freq Set	
		▼ OPE Freq Set	
		▼ OPT1 Freq Set	
		▼ OPT2 Freq Set	
		▼ RS485 Freq Set	

Trips	➤		➤ # of Trips	D080
			▼ Trip 1 Err Code	D081
			▼ Trip 1 Status	D081
			▼ Freq at Trip 1	D081
			▼ I at Trip 1	D081
			▼ PN-V at Trip 1	D081
			▼ Run-Time Trip 1	D081
			▼ Pwr-Time Trip 1	D081
			▼ Trip 2 Err Code	D082
			▼ Trip 2 Status	D082
			▼ Freq at Trip 2	D082
			▼ I at Trip 2	D082
			▼ PN-V at Trip 2	D082
			▼ Run-Time Trip 2	D082
			▼ Pwr-Time Trip 2	D082
			▼ Trip 3 Err Code	D083
			▼ Trip 3 Status	D083
			▼ Freq at Trip 3	D083
			▼ I at Trip 3	D083
			▼ PN-V at Trip 3	D083
			▼ Run-Time Trip 3	D083
			▼ Pwr-Time Trip 3	D083
			▼ Trip 4 Err Code	D084
			▼ Trip 4 Status	D084
			▼ Freq at Trip 4	D084
			▼ I at Trip 4	D084
			▼ PN-V at Trip 4	D084
			▼ Run-Time Trip 4	D084
			▼ Pwr-Time Trip 4	D084
			▼ Trip 5 Err Code	D085
			▼ Trip 5 Status	D085
			▼ Freq at Trip 5	D085
			▼ I at Trip 5	D085
			▼ PN-V at Trip 5	D085
			▼ Run-Time Trip 5	D085

			▼ Pwr-Time Trip 5	D085
			▼ Trip 6 Err Code	D086
			▼ Trip 6 Status	D086
			▼ Freq at Trip 6	D086
			▼ I at Trip 6	D086
			▼ PN-V at Trip 6	D086
			▼ Run-Time Trip 6	D086
			▼ Pwr-Time Trip 6	D086
Network Control	➤		➤ Control Method	
			▼ Host Watchdog	
			▼ Timeout Action	
Software Lock	➤		➤ Operator Access	
			▼ SW Lock Mode	B031
Debug Mode	➤		➤ (Address - Data) Press Esc/Cancel to exit Debug Mode	
Edit Mode	➤ **Inverter Port Cfg**		➤ Inverter Type	
	▼ **Network Port Cfg**		➤ Network Protocol	
			▼ Network Address	
			▼ Port Type	
			▼ Baud Rate	
			▼ Data bits	
			▼ Parity	
			▼ Stop Bits	
			▼ Flow Control	
			▼ RTS Delay	
			▼ Master/Slave	
			▼ Max Gap TIme	
			▼ Stop Key Action	

▼ **Store Configuration**	➤ Configuration stored
▼ **Transfer Mode**	➤ Waiting for PC... Press the Mode key to return to the Edit Menu.
▼ **Run Mode**	➤ Exits Edit Mode and Resets SC-OPE
▼ **Diagnostics Mode**	➤ Tests port and keypad. Hold Mode key to exit.
▼ **DOP Mode**	➤ Hitachi Digital Operator Mode

SJ100 / L100 Program Menu List

B

In This Appendix. . . . page

• SJ100 / L100 Inverter Program Menu List 2

SJ100 / L100 Inverter Program Menu List

Note: *Parameters with an asterisk (*) are available only on the SJ100 (not L100).*

Monitor Vars	➤	➤ VAR 1.1	
		▼ VAR 1.2	
		▼ VAR 1.3	
		▼ VAR 2	
Parameters	**➤ Initial**	➤ Debug Mode Sel	C091
		▼ Run Key Routing	F004
		▼ Init Mode	B084
		▼ Country Code	B085
		▼ Voltage Class Code	
	▼ Base Settings	➤ Freq Set Method	A001
		▼ Run Set Method	A002
		▼ Base Frequency	A003
		▼ 2nd Base Freq	A203 *
		▼ Max Frequency	A004 *
		▼ 2nd Max Freq	A204
		▼ AVR Function	A081
		▼ AVR Voltage	A082
		▼ Carrier Freq	B083
	▼ Speed/Jogging	➤ Multi-Speed 0	A020
		▼ 2nd Multi-Spd	A220 *
		▼ Multi-Speed 1	A021
		▼ Multi-Speed 2	A022
		▼ Multi-Speed 3	A023
		▼ Multi-Speed 4	A024
		▼ Multi-Speed 5	A025
		▼ Multi-Speed 6	A026
		▼ Multi-Speed 7	A027
		▼ Multi-Speed 8	A028

			▼ Multi-Speed 9 A029
			▼ Multi-Speed 10 A030
			▼ Multi-Speed 11 A031
			▼ Multi-Speed 12 A032
			▼ Multi-Speed 13 A033
			▼ Multi-Speed 14 A034
			▼ Multi-Speed 15 A035
			▼ Jogging Freq A038
			▼ Jogging Mode A039
	▼ V/F Character		➤ Torq Boost Sel A041
			▼ 2nd Torq Boost A241 *
			▼ Man Torq Boost A042
			▼ 2nd Man Boost A242 *
			▼ Man Boost Freq A043
			▼ 2nd Man Freq A243 *
			▼ V/F Curve A044
			▼ 2nd V/F Curve A244 *
			▼ V/F Gain A045
	▼ DC Braking		➤ DCB Selection A051
			▼ DCB Frequency A052
			▼ DCB Wait Time A053
			▼ DCB Force A054
			▼ DCB Time A055
	▼ PID Control		➤ PID Function A071
			▼ PID P Gain A072
			▼ PID I Gain A073
			▼ PID D Gain A074
			▼ PV Scale A075
			▼ PV Source A076
			▼ PID Deviation C044
	▼ BRD		➤ BRD Use Rate B090

▼ **Operation**		➤ 2-Stage Adj	A094 *
		▼ 2nd 2-Stage Adj	A294 *
		▼ Start Freq Adj	B082
		▼ Motor Direction	F004
▼ **Accel**		➤ Acceleration 1	F002
		▼ 2nd Accel 1	F202 *
		▼ Acceleration 2	A092
		▼ 2nd Accel 2	A292 *
		▼ Accel Ch Freq	A095
		▼ 2nd Acc Ch Freq	A295 *
		▼ Accel Curve	A097
▼ **Decel**		▼ Deceleration 1	F003
		▼ 2nd Decel 1	F203 *
		▼ Deceleration 2	A093
		▼ 2nd Decel 2	A293 *
		▼ Decel Ch Freq	A096
		▼ 2nd Dec Ch Freq	A296 *
		▼ Decel Curve	A098
▼ **Protection**		▼ E-Therm Level	B012
		▼ 2nd E-Thm Level	B212 *
		▼ E-Therm Char	B013
		▼ 2nd E-Thm Char	B213
▼ **Terminal**	➤ **Input Defs**	➤ Input Term 1	C001
		▼ Input Term 2	C002
		▼ Input Term 3	C003
		▼ Input Term 4	C004
		▼ Input Term 5	C005
		▼ Input Term 6	C006 *

		▼ **Input States**	➤ Input 1 NO/NC	C011
			▼ Input 2 NO/NC	C012
			▼ Input 3 NO/NC	C013
			▼ Input 4 NO/NC	C014
			▼ Input 5 NO/NC	C015
			▼ Input 6 NO/NC	C016 *
		▼ **Analog Input**	➤ Ext Freq Start	A011
			▼ Ext Freq End	A012
			▼ Ext Bias Start	A013
			▼ Ext Bias End	A014
			▼ Ext Freq Offset	A015
			▼ Sampling Number	A016
		▼ **Analog Meter**	➤ FM Adjustment	B081
			▼ L-O Adjustment	C081
			▼ L-OI Adjustment	C082
		▼ **Output Defs**	➤ Output Term 11	C021
			▼ Output Term 12	C022
			▼ Output Term FM	C023
			▼ Output Term AL	C024 *
		▼ **Output States**	➤ Output 11 NO/NC	C031
			▼ Output 12 NO/NC	C032
			▼ Output AL NO/NC	C033
		▼ **Output Levels**	➤ Accel Arv Freq	C042
			▼ Decel Arv Freq	C043
	▼ **Motor Data (SLV)**		➤ Autotuning Sel	H001 *
			▼ Motor Data	H002 *
			▼ 2nd Motor Data	H202 *
			▼ Motor Capacity	H003 *
			▼ 2nd Motor Cap	H203 *
			▼ Motor Poles	H004 *
			▼ 2nd Motor Poles	H204 *
			▼ Motor Const Kp	H005 *
			▼ 2nd Mtr Cnst Kp	H205 *
			▼ Motor Stab Cnst	H006 *

			▼ 2nd Motor Stab	H206 *
			▼ Motor Const R1	H020 *
			▼ 2nd Mtr Cnst R1	H220 *
			▼ Motor Const R2	H021 *
			▼ 2nd Mtr Cnst R2	H221 *
			▼ Motor Const L	H022 *
			▼ 2nd Mtr Cnst L	H222 *
			▼ Motor Const Io	H023 *
			▼ 2nd Mtr Cnst Io	H223 *
			▼ Motor Const J	H024 *
			▼ 2nd Mtr Cnst J	H224 *
Status	**➤ Monitor Values**		➤ Output Freq	D001
			▼ Output Current	D002
			▼ Rotation Dir.	D003
			▼ PID Feedback	D004
			▼ Inp. Terminals	D005
			▼ Out. Terminals	D006
			▼ Freq Multiplier	B086
			▼ Scaled Freq	D007
			▼ Input Voltage	
			▼ P-N Voltage	
			▼ kW Power	
			▼ kW Rating	
	▼ Operation Status		➤ Status Byte	
			▼ Status State	
	▼ Frequency Status		➤ VM Freq Set	
			▼ TRM Freq Set	

Trips	➤		➤ # of Trips	D008
			▼ Trip 1 Err Code	D008
			▼ Freq at Trip 1	D008
			▼ I at Trip 1	D008
			▼ PN-V at Trip 1	D008
			▼ Time at Trip 1	D008
			▼ Trip 2 Err Code	D009
			▼ Freq at Trip 2	D009
			▼ I at Trip 2	D009
			▼ PN-V at Trip 2	D009
			▼ Time at Trip 2	D009
			▼ Trip 3 Err Code	D009
			▼ Freq at Trip 3	D009
			▼ I at Trip 3	D009
			▼ PN-V at Trip 3	D009
			▼ Time at Trip 3	D009
Network Control	➤		➤ Control Method	
			▼ Host Watchdog	
			▼ Timeout Action	
Software Lock	➤		➤ Operator Access	
			▼ SW Lock Mode	B031
Debug Mode	➤		➤ (Address - Data) Press Esc/Cancel to exit Debug Mode	

Edit Mode	➤ **Inverter Port Cfg**	➤ Inverter Type
	▼ **Network Port Cfg**	➤ Network Protocol ▼ Network Address ▼ Port Type ▼ Baud Rate ▼ Data bits ▼ Parity ▼ Stop Bits ▼ Flow Control ▼ RTS Delay ▼ Master/Slave ▼ Max Gap TIme ▼ Stop Key Action
	▼ **Store Configuration**	➤ Configuration stored
	▼ **Transfer Mode**	➤ Waiting for PC... Press the Mode key to return to the Edit Menu.
	▼ **Run Mode**	➤ Exits Edit Mode and Resets SC-OPE

J300 Program Menu List

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J300 Inverter Program Menu List

Monitor Vars	➤		➤ VAR 1.1
			▼ VAR 1.2
			▼ VAR 1.3
			▼ VAR 2
Parameters	➤ **Command**		➤ Freq Set Method
			▼ Run Set Method
			▼ Param Set Method
	▼ **Initial**		➤ Trip History Mode
			▼ Enable Debug Mode
			▼ Run Key Routing
	▼ **Control**	➤ **V/F Settings**	➤ Base Freq (p)
			▼ Base Freq (s)
			▼ Max Freq (p)
			▼ Max Freq (s)
			▼ OPE Set Freq (p)
			▼ OPE Set Freq (s)
			▼ Jogging Freq
			▼ Start Freq
			▼ Ctrl Method (p)
			▼ Ctrl Method (s)
			▼ V/F Pattern (p)
			▼ V/F Pattern (s)
			▼ Input Voltage
			▼ AVR Dec
		▼ **Motor Data**	➤ Auto Tuning (p)
			▼ Auto Tuning (s)
			▼ Motor Const Data (p)
			▼ Motor Const Data (s)
			▼ Motor Pole Count (p)
			▼ Motor Pole Count (s)
			▼ Motor Capacity (p)
			▼ Motor Capacity (s)

			▼ Motor Cap (eu) (p)
			▼ Motor Cap (eu) (s)
			▼ Resistor R1 (p)
			▼ Resistor R1 (s)
			▼ Resistor R2 (p)
			▼ Resistor R2 (s)
			▼ Inductor L1+L2 (p)
			▼ Inductor L1+L2 (s)
			▼ Mut Inductor M (p)
			▼ Mut Inductor M (s)
			▼ Inertia J (p)
			▼ Inertia J (s)
			▼ ASR Kp (p)
			▼ ASR Kp (s)
			▼ ASR Ti (p)
			▼ ASR Ti (s)
			▼ ASR Kpp (p)
			▼ ASR Kpp (s)
		▼ Carrier Freq	➤
	▼ Accel		➤ Accel 1 (p)
			▼ Accel 1 (s)
			▼ Accel 2
			▼ Accel Curve
			▼ Curve Constant
	▼ Decel		➤ Decel 1 (p)
			▼ Decel 1 (s)
			▼ Decel 2
			▼ Decel Curve
			▼ Curve Constant

	▼ **Operation**		➤ Frequency Stop
			▼ Operation Pattern
			▼ Multi-stage Speed
			▼ Process Advance 1
			▼ Process Advance 2
			▼ Process Advance 3
			▼ Process Advance 4
			▼ Process Advance 5
			▼ Process Advance 6
			▼ Process Advance 7
			▼ Process Advance 8
	▼ **Braking**	➤ **DC Braking**	➤ DCB Enable
			▼ DCB Type
			▼ DCB Freq
			▼ DCB Force (start)
			▼ DCB Force (stop)
			▼ DCB Time (start)
			▼ DCB Time (stop)
			▼ DCB Shutoff Time
		▼ **Regen Brake Ratio**➤	
	▼ **Protection**	➤ **E-Thermal**	➤ E-Thermal Char (p)
			▼ E-Thermal Char (s)
			▼ E-Thermal Level (p)
			▼ E-Thermal Level (s)
			▼ E-Thermal Current 1
			▼ E-Thermal Freq 1
			▼ E-Thermal Current 2
			▼ E-Thermal Freq
			▼ E-Thermal Current 3
			▼ E-Thermal Freq 3
		▼ **Overload**	➤ Oload Limit level
			▼ OLoad Limit Const
			▼ OLoad Limit Acc

		▼ **Freq Protect**	➤ Min Freq Limit
			▼ Max Freq Limit
			▼ Jump Freq 1
			▼ Jump Freq 2
			▼ Jump Freq 3
			▼ Jump Freq Width
		▼ **IPS**	➤ IPS Failure Time
			▼ IPS Wait Time
			▼ IPS Restart Op
			▼ IPS Tripping
		▼ **Other**	➤ Max Freq Select
			▼ SW Lock Mode
			▼ STOP Key Enable
			▼ Operation Direction
			▼ Rev Run Prevention
	▼ **Terminal**	➤ **Analog Input**	➤ Analog Input Voltage
			▼ Analog Meter Corr
			▼ Ext Freq (start)
			▼ Ext Freq (end)
			▼ Ext Freq % (start)
			▼ Ext Freq % (stop)
		▼ **Signal Output**	➤ Freq Arv Pattern
			▼ Targ Accel Freq
			▼ Targ Decel Freq
			▼ Ov-Trq Power
			▼ Ov-Trq Sig Regen
		▼ **Terminal Defs**	➤ Input Pin 1
			▼ Input Pin 2
			▼ Input Pin 3
			▼ Input Pin 4
			▼ Input Pin 5
			▼ Input Pin 6
			▼ Input Pin 7
			▼ Input Pin 8

			▼ Input Pin 1 NO/NC
			▼ Input Pin 2 NO/NC
			▼ Input Pin 3 NO/NC
			▼ Input Pin 4 NO/NC
			▼ Output Pin 11
			▼ Output Pin 12
			▼ Output Pin 1 NO/NC
			▼ Output Pin 2 NO/NC
			▼ Alarm Output NO/NC
		▼ Monitor Signal	➤
	▼ Option	**➤ Option Error**	➤ OPI Error Oper.
			▼ OP2 Error Oper.
		▼ Option Select	➤ Encoder Pulses
			▼ Option Ctrl Mode
			▼ Option RO-TO
		▼ Orient	➤ Orient Stop Pos Chg
			▼ Orient Stop Pos
			▼ Orient Speed
			▼ Orient Direction
			▼ Orient End Range
			▼ Orient End Delay
		▼ Position	➤ Gear Setting Pos.
			▼ Gear Ratio (num)
			▼ Gear Ratio (den)
			▼ Feed Fwd Gain
			▼ Positional Gain
		▼ Torque	➤ Torque Limiter
			▼ Fwd Torque Limit
			▼ Rev Torque Limit
			▼ Torque Boost (p)
			▼ Torque Boost (s)
			▼ V-gain Set Value

		▼ PID	➤ PID Switching
			▼ Feedback AC/DC
			▼ Target PID Value
			▼ PID P Gain
			▼ PID I Gain
			▼ PID D Gain
		▼ Digital	➤ Dig Input Term
			▼ Dig Output Term
			▼ Dig Thermal Level
		▼ Analog	➤ Ana Input Term
			▼ Ana Output Term
		▼ Communications	➤ COMM Baud Rate
			▼ COMM Station Num
			▼ COMM Data Bits
			▼ COMM Parity
			▼ COMM Parity
			▼ COMM Stop Bits
			▼ COMM Test Mode
Status	➤ **P/S Selection**		➤ -
	▼ **Operation Status**		➤ Status 1
			▼ Status 2
			▼ Status 3
	▼ **Terminal Status**		➤ Terminal I/O Status
			▼ Input Term Info 1
			▼ Input Term Info 2
			▼ Input Term Info 3
			▼ Input Term Info 4
			▼ Output Term Info

▼ **Monitor Values**

- ➤ OPE Freq Set. (p)
- ▼ OPE Freq Set. (s)
- ▼ TRM Freq Set.
- ▼ OP1 Freq Set.
- ▼ OP2 Freq Set.
- ▼ Preset Freq
- ▼ Current Freq
- ▼ Freq Multiplier
- ▼ Scaled Freq
- ▼ Rotation Dir.
- ▼ Mot Poles - rpm
- ▼ Rotation Speed
- ▼ Output Cur (A)
- ▼ Output Cur (%)
- ▼ Output Torque (%)
- ▼ P-N Voltage
- ▼ Input Voltage
- ▼ kW Power
- ▼ kW Hours
- ▼ kW Ratio
- ▼ Total Svc Time

▼ **Inverter Setup**

- ➤ Country Code
- ▼ Model Code
- ▼ Voltage Class

Trips	➤		➤ Warning (p) ▼ Warning (s) ▼ Total # of Trips ▼ Cur. Trip Factor ▼ Trip Factor 1 ▼ Tripping Freq 1 ▼ Tripping Cur 1 ▼ Tripping P-N V 1 ▼ Days at Trip 1 ▼ Trip Factor 2 ▼ Tripping Freq 2 ▼ Tripping Cur 2 ▼ Tripping P-N V 2 ▼ Days at Trip 2 ▼ Trip Factor 3 ▼ Tripping Freq 3 ▼ Tripping Cur 3 ▼ Tripping P-N V 3 ▼ Days at Trip 3
Network Control	➤		➤ Control Method ▼ Host Watchdog ▼ Timeout Action
Software Lock	➤		➤ Operator Access ▼ SW Lock Mode
Configura-tion Mode			➤ [ENTER]
Reset KW Hours			➤

SJ300 / L300P Network Register Maps

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- SJ300 and L300P Building Network Register Maps. . . 18

SJ300 and L300P Factory Network Register Maps

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40001	V2000	N7:0	Read	N/A	Network Control Flag	0=Keypad Control	Numeric Code	Used Only by SC-OPE (not sent to inverter)
40002	V2001	N7:1	R/W	N/A	Watchdog Timeout Value	0=Disabled or 100 — 30000	ms	Used Only by SC-OPE (Not Sent to inverter)
40003	V2002	N7:2	R/W	N/A	Watchdog Timeout Action (only applicable when control is from network and motor is running)	0 = Stop Motor 1 = Stop Motor And Disable Network Control 2 = Continue Running	Numeric Code	Used Only by SC-OPE (Not Sent to inverter)
40004	V2003	N7:3	Write	N/A	Store to EEPROM (stores any changed drive parameters into drive's EEPROM)	0 = Do Nothing 1 = Store to EEPROM	—	Will prevent monitor data from being updated for 5 seconds
40005	V2004	N7:4	Write	Write	Run Command	0=Stop 1=Run Forward 2=Run Reverse	Numeric Code	Valid Regardless of Motor Selected (1st, 2nd, 3rd)
40006	V2005	N7:5	R/W	R/W	Preset Frequency	0 — 40000	.01 Hz	Valid Regardless of Motor Selected (1st, 2nd, 3rd)
40007	V2006	N7:6	R/W	R/W	Acceleration Time	1 — 36000	.1 s	Valid Regardless of Motor Selected (1st, 2nd, 3rd)
40008	V2007	N7:7	R/W	R/W	Deceleration Time	1 — 36000	.1 s	Valid Regardless of Motor Selected (1st, 2nd, 3rd)

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40009	V2010	N7:8	Read	Read	Run Status	Bits 1-0: State 0x01=Stopped 0x02=Decelerating 0x03=Constant Speed 0x04=Accelerating Bit 4-2: Not Used Bit 5: Inverter Comm Error 0=OK, 1= No Comm Bit 6: Trip Flag 0=No Trip, 1=Tripped Bit 7: Run Flag 0=Stopped, 1=Running	Bit Flag	
40010	V2011	N7:9	Read	D001	Output Frequency	0 — 40000	.01 Hz	
40011	V2012	N7:10	Read	D002	Output Current	0 — 65535	.1 A	
40012	V2013	N7:11	Read	D003	Direction of Output	0=Stopped 1=Forward 2=Reverse	—	
40013	V2014	N7:12	Read	D004	PID Feedback	0 — 65535	%	
40014	V2015	N7:13	Read	D005	Intelligent Input Status	Bit 0: Input Terminal 1 Bit 1: Input Terminal 2 Bit 2: Input Terminal 3 Bit 3: Input Terminal 4 Bit 4: Input Terminal 5 Bit 5: Input Terminal 6 Bit 6: Input Terminal 7 Bit 7: Input Terminal 8 Bit 8: Input Terminal FW	Bit Flag 0=Off, 1=On	
40015	V2016	N7:14	Read	D006	Intelligent Output Status	Bit 0: Output Terminal 11 Bit 1: Output Terminal 12 Bit 2: Output Terminal 13 Bit 3: Output Terminal 14 Bit 4: Output Terminal 15 Bit 5: Output Terminal AL	Bit Flag 0=Off, 1=On	
40016	V2017	N7:15	Read	D007	Frequency Conversion Monitor	0 — 65535	.01 units	
40017	V2020	N7:16	Read	D012	Output Torque	-300 — +300	%	(SJ300 Only)
40018	V2021	N7:17	Read	D013	Output Voltage	0 — 65535	.1 V	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40019	V2022	N7:18	Read	Read	Input voltage	0 — 65535	.1 V	
40020	V2023	N7:19	Read	Read	P-N Voltage	0 — 65535	.1 V	
40021	V2024	N7:20	Read	Read	Terminal Set Frequency	0 — 65535	.01 Hz	
40022	V2025	N7:21	Read	D014	Input Power	0 — 65535	.1 kW	
40023	V2026	N7:22	Read	D016	Accumulated Run Time	0 — 65535	Days	
40024	V2027	N7:23	Read	D017	Accum. Power On Time	0 — 65535	Days	
40025	V2030	N7:24	Read	D080	Number of Trips	0 — 65535	Count	
40026	V2031	N7:25	Read	D081	Trip 1 Factor (Most Recent)	0 — 79	Error Number	
40027	V2032	N7:26	Read	D081	Trip 1 Frequency	0 — 65535	.01 Hz	
40028	V2033	N7:27	Read	D081	Trip 1 Output Current	0 — 65535	.01 A	
40029	V2034	N7:28	Read	D081	Trip 1 P-N Voltage	0 — 65535	.1 V	
40030	V2035	N7:29	Read	D081	Trip 1 Run Time	0 — 65535	Days	
40031	V2036	N7:30	Read	D081	Trip 1 Power On Time	0 — 65535	Days	
40032	V2037	N7:31	Read	D082	Trip 2 Factor	0 — 79	Error Number	
40033	V2040	N7:32	Read	D082	Trip 2 Frequency	0 — 65535	.01 Hz	
40034	V2041	N7:33	Read	D082	Trip 2 Output Current	0 — 65535	.01 A	
40035	V2042	N7:34	Read	D082	Trip 2 P-N Voltage	0 — 65535	.1 V	
40036	V2043	N7:35	Read	D082	Trip 2 Run Time	0 — 65535	Days	
40037	V2044	N7:36	Read	D082	Trip 2 Power On Time	0 — 65535	Days	
40038	V2045	N7:37	Read	D083	Trip 3 Factor	0 — 79	Error Number	
40039	V2046	N7:38	Read	D083	Trip 3 Frequency	0 — 65535	.01 Hz	
40040	V2047	N7:39	Read	D083	Trip 3 Output Current	0 — 65535	.01 A	
40041	V2050	N7:40	Read	D083	Trip 3 P-N Voltage	0 — 65535	.1 V	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40042	V2051	N7:41	Read	D083	Trip 3 Run Time	0 — 65535	Days	
40043	V2052	N7:42	Read	D083	Trip 3 Power On Time	0 — 65535	Days	
40044	V2053	N7:43	Read	D084	Trip 4 Factor	0 — 79	Error Number	
40045	V2054	N7:44	Read	D084	Trip 4 Frequency	0 — 65535	.01 Hz	
40046	V2055	N7:45	Read	D084	Trip 4 Output Current	0 — 65535	.01 A	
40047	V2056	N7:46	Read	D084	Trip 4 P-N Voltage	0 — 65535	.1 V	
40048	V2057	N7:47	Read	D084	Trip 4 Run Time	0 — 65535	Days	
40049	V2060	N7:48	Read	D084	Trip 4 Power On Time	0 — 65535	Days	
40050	V2061	N7:49	Read	D085	Trip 5 Factor	0 — 79	Error Number	
40051	V2062	N7:50	Read	D085	Trip 5 Frequency	0 — 65535	.01 Hz	
40052	V2063	N7:51	Read	D085	Trip 5 Output Current	0 — 65535	.01 A	
40053	V2064	N7:52	Read	D085	Trip 5 P-N Voltage	0 — 65535	.1 V	
40054	V2065	N7:53	Read	D085	Trip 5 Run Time	0 — 65535	Days	
40055	V2066	N7:54	Read	D085	Trip 5 Power On Time	0 — 65535	Days	
40056	V2067	N7:55	Read	D086	Trip 6 Factor (Least Recent)	0 — 79	Error Number	
40057	V2070	N7:56	Read	D086	Trip 6 Frequency	0 — 65535	.01 Hz	
40058	V2071	N7:57	Read	D086	Trip 6 Output Current	0 — 65535	.01 A	
40059	V2072	N7:58	Read	D086	Trip 6 P-N Voltage	0 — 65535	.1 V	
40060	V2073	N7:59	Read	D086	Trip 6 Run Time	0 — 65535	Days	
40061	V2074	N7:60	Read	D086	Trip 6 Power On Time	0 — 65535	Days	
40062	V2075	N7:61	R/W	F002	Acceleration time	0 — 36000	.1 s	
40063	V2076	N7:62	R/W	F202	2nd Acceleration time	0 — 36000	.1 s	
40064	V2077	N7:63	R/W	F302	3rd Acceleration time	0 — 36000	.1 s	(SJ300 Only)

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40065	V2100	N7:64	R/W	F003	Deceleration time	0 — 36000	.1 s	
40066	V2101	N7:65	R/W	F203	2nd Deceleration time	0 — 36000	.1 s	
40067	V2102	N7:66	R/W	F303	3rd Deceleration time	0 — 36000	.1 s	(SJ300 Only)
40068	V2103	N7:67	R/W	A005	AT Terminal Selection	0 = Changing O and OI 1= Changing O and O2	—	
40069	V2104	N7:68	R/W	A020	Multi-Speed 0	0 — 40000	.01 Hz	
40070	V2105	N7:69	R/W	A220	2nd Multi-Speed 0	0 — 40000	.01 Hz	
40071	V2106	N7:70	R/W	A320	3rd Multi-Speed 0	0 — 40000	.01 Hz	(SJ300 Only)
40072	V2107	N7:71	R/W	A021	Multi-Speed 1	0 — 40000	.01 Hz	
40073	V2110	N7:72	R/W	A022	Multi-Speed 2	0 — 40000	.01 Hz	
40074	V2111	N7:73	R/W	A023	Multi-Speed 3	0 — 40000	.01 Hz	
40075	V2112	N7:74	R/W	A024	Multi-Speed 4	0 — 40000	.01 Hz	
40076	V2113	N7:75	R/W	A025	Multi-Speed 5	0 — 40000	.01 Hz	
40077	V2114	N7:76	R/W	A026	Multi-Speed 6	0 — 40000	.01 Hz	
40078	V2115	N7:77	R/W	A027	Multi-Speed 7	0 — 40000	.01 Hz	
40079	V2116	N7:78	R/W	A028	Multi-Speed 8	0 — 40000	.01 Hz	
40080	V2117	N7:79	R/W	A029	Multi-Speed 9	0 — 40000	.01 Hz	
40081	V2120	N7:80	R/W	A030	Multi-Speed 10	0 — 40000	.01 Hz	
40082	V2121	N7:81	R/W	A031	Multi-Speed 11	0 — 40000	.01 Hz	
40083	V2122	N7:82	R/W	A032	Multi-Speed 12	0 — 40000	.01 Hz	
40084	V2123	N7:83	R/W	A033	Multi-Speed 13	0 — 40000	.01 Hz	
40085	V2124	N7:84	R/W	A034	Multi-Speed 14	0 — 40000	.01 Hz	
40086	V2125	N7:85	R/W	A035	Multi-Speed 15	0 — 40000	.01 Hz	
40087	V2126	N7:86	R/W	A071	PID selection	0=Invalid, 1=Valid	Code	
40088	V2127	N7:87	R/W	A072	PID-P gain	2 — 50	.1 units	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40089	V2130	N7:88	R/W	A073	PID-I gain	0 — 36000	.1 s	
40090	V2131	N7:89	R/W	A074	PID-D gain	0 — 10000	.01 s	
40091	V2132	N7:90	R/W	A075	PID scale	1 — 9999	.01 units	
40092	V2133	N7:91	R/W	A076	PID feedback selection	0=Feedback OI, 1=Feedback O	—	
40093	V2134	N7:92	R/W	P014	Orientation Stop Position	0 — 4095	Pulse	(SJ300 Only)
40094	V2135	N7:93	R/W	P015	Orientation Speed Setting	50 — 6000	.01 Hz	(SJ300 Only)
40095	V2136	N7:94	R/W	P016	Orientation Direction	0=Forward 1=Reverse	—	(SJ300 Only)
40096	V2137	N7:95	R/W	P017	Orientation Completion Range	0 — 10000	Pulse	(SJ300 Only)
40097	V2140	N7:96	R/W	P018	Orientation Completion Delay Time	0 — 999	.01 s	(SJ300 Only)
40098	V2141	N7:97	R/W	P020	Electronic Gear Numerator	1 — 9999	1-9999	(SJ300 Only)
40099	V2142	N7:98	R/W	P021	Electronic Gear Denominator	1 — 9999	1-9999	(SJ300 Only)
40100	V2143	N7:99	Read	—	Output Terminal Information Word 1	See table on page D–15	Bit Flag 0=Off, 1=On	
40101	V2144	N7:100	Read	—	Output Terminal Information Word 2	See table on page D–15	Bit Flag 0=Off, 1=On	
40102	V2145	N7:101	Read	—	Input Terminal Information Word 1	See table on page D–13	Bit Flag 0=Off, 1=On	
40103	V2146	N7:102	Read	—	Input Terminal Information Word 2	See table on page D–13	Bit Flag 0=Off, 1=On	
40104	V2147	N7:103	Read	—	Input Terminal Information Word 3	See table on page D–14	Bit Flag 0=Off, 1=On	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40105	V2150	N7:104	Read	—	Input Terminal Information Word 4	See table on page D–14	Bit Flag 0=Off, 1=On	
40106	V2151	N7:105	R/W	A019	Multi-Speed Select	0=16-Stage 4-Terminals 1=8-Stage 7-Terminals	—	
40107	V2152	N7:106	R/W	A038	Jogging Frequency	0 — 999	.01 Hz	
40108	V2153	N7:107	R/W	A039	Jogging selection	0=Free run/invalid on run 1=Stop decel/invalid on run 2=DC brake/invalid on run 3=Free run/valid on run 4=Stop decel/valid on run 5=DC brake/valid on run	—	
40109	V2154	N7:108	R/W	A092	Acceleration time2	0 — 36000	.1 s	
40110	V2155	N7:109	R/W	A292	2nd Acceleration time2	0 — 36000	.1 s	
40111	V2156	N7:110	R/W	A392	3rd Acceleration time2	0 — 36000	.1 s	(SJ300 Only)
40112	V2157	N7:111	R/W	A095	Acceleration frequency2	0 — 40000	.01 Hz	
40113	V2160	N7:112	R/W	A295	2nd Acceleration frequency2	0 — 40000	.01 Hz	
40114	V2161	N7:113	R/W	A097	Acceleration pattern selection	0=Straight Line 1=S-Curve 2=U-Curve 3=Reverse U-Curve	—	
40115	V2162	N7:114	R/W	A131	Acceleration curve constant	1 — 10	1-10	
40116	V2163	N7:115	R/W	A093	Deceleration time 2	0 — 36000	.1 s	
40117	V2164	N7:116	R/W	A293	2nd Deceleration time2	0 — 36000	.1 s	
40118	V2165	N7:117	R/W	A393	3rd Deceleration time2	0 — 36000	.1 s	(SJ300 Only)
40119	V2166	N7:118	R/W	A096	Deceleration frequency2	0 — 40000	.01 Hz	.01 Hz
40120	V2167	N7:119	R/W	A296	2nd deceleration frequency	0 — 40000	.01 Hz	
40121	V2170	N7:120	R/W	A098	Deceleration pattern selection	0=Straight Line 1=S-Curve 2=U-Curve 3=Reverse U-Curve	—	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40122	V2171	N7:121	R/W	A132	Deceleration curve constant	1 — 10	1-10	
40123	V2172	N7:122	R/W	A001	Frequency setting selection	0=VR 1=Terminal 2=Operator 3=RS485 4=Option 1 5=Option 2	—	
40124	V2173	N7:123	R/W	A002	Operation setting selection	1=Terminal 2=Operator 3=RS485 4=Option 1 5=Option 2	—	
40125	V2174	N7:124	R/W	A003	Base frequency setting	30 — 400	Hz	
40126	V2175	N7:125	R/W	A203	2nd Base frequency	30 — 400	Hz	
40127	V2176	N7:126	R/W	A303	3rd Base Frequency	30 — 400	Hz	(SJ300 Only)
40128	V2177	N7:127	R/W	A004	Maximum Frequency	30 — 400	Hz	
40129	V2200	N7:128	R/W	A204	2nd M Maximum frequency	30 — 400	Hz	
40130	V2201	N7:129	R/W	A304	3rd M maximum frequency	30 — 400	Hz	(SJ300 Only)
40131	V2202	N7:130	R/W	A082	Motor voltage selection	0=200,1=215,2=220,3=23 0,4=240,5=380,6=400,7=4 15,8=440,9=460,10=480,1 1=575,12=600	—	
40132	V2203	N7:131	R/W	B083	Carrier frequency setting	5 — 120	.1 Hz	
40133	V2204	N7:132	R/W	C001	Intelligent input 1 setting	See table on page D–16	—	
40134	V2205	N7:133	R/W	C002	Intelligent input 2 setting	See table on page D–16	—	
40135	V2206	N7:134	R/W	C003	Intelligent input 3 setting	See table on page D–16	—	
40136	V2207	N7:135	R/W	C004	Intelligent input 4 setting	See table on page D–16	—	
40137	V2210	N7:136	R/W	C005	Intelligent input 5 setting	See table on page D–16	—	
40138	V2211	N7:137	R/W	C006	Intelligent input 6 setting	See table on page D–16	—	(SJ300 Only)
40139	V2212	N7:138	R/W	C007	Intelligent input 7 setting	See table on page D–16	—	(SJ300 Only)

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40140	V2213	N7:139	R/W	C008	Intelligent input 8 setting	See table on page D–16	—	(SJ300 Only)
40141	V2214	N7:140	R/W	C011	Intelligent input 1 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	—	
40142	V2215	N7:141	R/W	C012	Intelligent input 2 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	—	
40143	V2216	N7:142	R/W	C013	Intelligent input 3 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	—	
40144	V2217	N7:143	R/W	C014	Intelligent input 4 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	—	
40145	V2220	N7:144	R/W	C015	Intelligent input 5 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	—	
40146	V2221	N7:145	R/W	C016	Intelligent input 6 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	—	(SJ300 Only)
40147	V2222	N7:146	R/W	C017	Intelligent input 7 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	—	(SJ300 Only)
40148	V2223	N7:147	R/W	C018	Intelligent input 8 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	—	(SJ300 Only)
40149	V2224	N7:148	R/W	C019	Input FW a/b (No/NC) selection	0=Normally Open 1=Normally Closed	—	
40150	V2225	N7:149	R/W	C021	Intelligent output 11 setting	See table on page D–17	—	
40151	V2226	N7:150	R/W	C022	Intelligent output 12 setting	See table on page D–17	—	
40152	V2227	N7:151	R/W	C023	Intelligent output 13 setting	See table on page D–17	—	(SJ300 Only)
40153	V2230	N7:152	R/W	C024	Intelligent output 14 setting	See table on page D–17	—	(SJ300 Only)
40154	V2231	N7:153	R/W	C025	Intelligent output 15 setting	See table on page D–17	—	(SJ300 Only)
40155	V2232	N7:154	R/W	C026	Alarm relay output	See table on page D–17	—	
40156	V2233	N7:155	R/W	C031	Intelligent output 11 a/b	0=Normally Open 1=Normally Closed	—	
40157	V2234	N7:156	R/W	C032	Intelligent output 12 a/b	0=Normally Open 1=Normally Closed	—	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40158	V2235	N7:157	R/W	C033	Intelligent output 13 a/b	0=Normally Open 1=Normally Closed	—	(SJ300 Only)
40159	V2236	N7:158	R/W	C034	Intelligent output 14 a/b	0=Normally Open 1=Normally Closed	—	(SJ300 Only)
40160	V2237	N7:159	R/W	C035	Intelligent output 15 a/b	0=Normally Open 1=Normally Closed	—	(SJ300 Only)
40161	V2240	N7:160	R/W	C036	Alarm relay output a/b	0=Normally Open 1=Normally Closed	—	
40162	V2241	N7:161	R/W	A061	1st frequency upper limiter	0 — 40000	.01 Hz	
40163	V2242	N7:162	R/W	A261	2nd frequency upper limiter	0 — 40000	.01 Hz	
40164	V2243	N7:163	R/W	A062	1st frequency lower limiter	0 — 40000	.01 Hz	
40165	V2244	N7:164	R/W	A262	2nd frequency lower limiter	0 — 40000	.01 Hz	
40166	V2245	N7:165	R/W	A063	Jump frequency1	0 — 40000	.01 Hz	
40167	V2246	N7:166	R/W	A064	Jump frequency Width 1	0 — 1000	.01 Hz	
40168	V2247	N7:167	R/W	A065	Jump frequency 2	0 — 40000	.01 Hz	
40169	V2250	N7:168	R/W	A066	Jump frequency width 2	0 — 1000	.01 Hz	
40170	V2251	N7:169	R/W	A067	Jump frequency 3	0 — 40000	.01 Hz	
40171	V2252	N7:170	R/W	A068	Jump frequency width 3	0 — 1000	.01 Hz	
40172	V2253	N7:171	R/W	A069	Acceleration stop frequency	0 — 40000	.01 Hz	
40173	V2254	N7:172	R/W	A070	Acceleration stop time	0 — 600	.1 s	
40174	V2255	N7:173	R/W	A041	Torque boost selection	0=Manual, 1=Automatic	—	
40175	V2256	N7:174	R/W	A241	2nd Torque boost selection	0=Manual, 1=Automatic	—	
40176	V2257	N7:175	R/W	A042	Manual torque boost	0 — 200	.1 %	
40177	V2260	N7:176	R/W	A242	2nd Manual torque boost	0 — 200	.1 %	
40178	V2261	N7:177	R/W	A342	3rd Manual torque boost	0 — 200	.1 %	(SJ300 Only)
40179	V2262	N7:178	R/W	A043	Manual torque boost point	0 — 500	.1 %	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ300/ L300P #Reg. #	SJ300 / L300P Parameter	Range / Value	Units	Notes
40180	V2263	N7:179	R/W	A243	2nd Manual torque boost point	0 — 500	.1 %	
40181	V2264	N7:180	R/W	A343	3rd Manual torque boost point	0 — 500	.1 %	(SJ300 Only)
40182	V2265	N7:181	R/W	A044	1st control	0=VC, 1=VP,2=Free V/F, 3=SLV, 4=0Hz-SLV,5=V2	—	
40183	V2266	N7:182	R/W	A244	2nd control	0=VC, 1=VP,2=Free V/F, 3=SLV, 4=0Hz-SLV	—	
40184	V2267	N7:183	R/W	A344	3rd control	0=VC, 1=VP,2=Free V/F,	—	(SJ300 Only)
40185	V2270	N7:184	R/W	A045	Output voltage gain	20 — 100	%	

Bit-level Definitions for Factory I/O Registers

Input Terminal Information

Input Terminal Information (Word 1)			
Bit	Description	Bit	Description
0	Position Train Position Command Input Enable	8	Not Used
1	Not Used	9	Not Used
2	Not Used	10	Not Used
3	Not Used	11	Not Used
4	Not Used	12	Not Used
5	Not Used	13	Not Used
6	Not Used	14	Not Used
7	Not Used	15	Not Used

Input Terminal Information (Word 2)			
Bit	Description	Bit	Description
0	Multi-Speed Bit1	8	Torque Limit Enable
1	Multi-Speed Bit2	9	Torque Limit Selection, Bit 1
2	Multi-Speed Bit3	10	Torque LimitSelection, Bit 2
3	Multi-Speed Bit4	11	Proportional / Proportional/Integral Selection
4	Multi-Speed Bit5	12	Brake Confirmation Signal
5	Multi-Speed Bit6	13	Orientation (Home Search)
6	Multi-Speed Bit7	14	LAC : LAD Cancel
7	Overload Restriction	15	Position Deviation Reset

Input Terminal Information (Word 3)			
Bit	**Description**	**Bit**	**Description**
0	Analog Input Voltage/Current Select	8	PID Reset
1	Set 3rd Motor data	9	Not Used
2	Reset Inverter	10	Control Gain Setting
3	Not Used	11	Remote Control UP Function
4	Start (3-Wire Interface)	12	Remote Control DOWN Function
5	Stop (3-Wire Interface)	13	Remote Control Data Clearing
6	FWD. REV (3-Wire Interface)	14	Not Used
7	PID Disable	15	Operator Control

Input Terminal Information (Word 4)			
Bit	**Description**	**Bit**	**Description**
0	Not Used	8	Set 2nd Motor
1	Reverse Run/Stop	9	2-Stage Accel and Decel
2	Multi-speed select, bit1	10	Not Used
3	Multi-speed select, bit 2	11	Free-run Stop
4	Multi-speed select, bit 3	12	External Trip
5	Multi-speed select, bit 4	13	Unattended Start Protection
6	Jogging	14	Commercial Power Source
7	External DC Braking	15	Software Lock

Output terminal Information

Output Terminal Information (Word 1)			
Bit	**Description**	**Bit**	**Description**
0	Not Used	8	Frequency Arrival Type 4 – over-frequency 2
1	Not Used	9	Frequency Arrival Type 5 – at-frequency (2)
2	Not Used	10	Overload Advance Notice Signal (2)
3	Brake Release Signal	11	Not Used
4	Brake Error Signal	12	Not Used
5	Zero Speed Detect	13	Not Used
6	Speed Deviation Maximum	14	Not Used
7	Position Completion	15	Not Used

Output Terminal Information (Word 2)			
Bit	**Description**	**Bit**	**Description**
0	Run Signal	8	Instantaneous Power Failure Signal
1	Frequency Arrival Type1 – Constant Speed	9	Under-voltage Signal
2	Frequency Arrival Type 2 – Over-frequency	10	In Torque Limit
3	Overload Advance Notice Signal (1)	11	Operation Time Over
4	Output Deviation for PID Control	12	Plug-in Time Over
5	Alarm Signal	13	Thermal Alarm Signal
6	Frequency Arrival Type 3 – at frequency	14	Not Used
7	Over-torque Signal	15	Not Used

Intelligent Input Setting Codes

Intelligent Input Terminal Setting Codes			
Code	**Description**	**Code**	**Description**
01	RV: Reverse Run/Stop	26	CAS: Control Gain Setting
02	CF1: Multi-speed select, bit 0	27	UP: Remote Control UP Function
03	CF2: Multi-Speed select, bit 1	28	DWN: Remote Control DOWN Function
04	CF3: Multi-speed select, bit 2	29	UDC: Remote Control Data Clearing
05	CF4: Multi-speed select, bit 3	30	Not Used
06	JG: Jogging	31	OPE: Operator Control
07	DB: External DC Braking	32	SF1: Multi-Speed Bit1
08	SET: Set 2nd Motor Data	33	SF2: Multi-Speed Bit2
09	2CH: 2-Stage Accel and Decel	34	SF3: Multi-Speed Bit3
10	Not Used	35	SF4: Multi-Speed Bit4
11	FRS: Free-run Stop	36	SF5: Multi-Speed Bit5
12	EXT: External Trip	37	SF6: Multi-Speed Bit6
13	USP: Unattended Start Protection	38	SF7: Multi-Speed Bit7
14	CS: Commercial Power Source	39	OLR: Overload Restriction
15	SFT: Software Lock	40	TL: Torque Limit Enable
16	AT: Analog Input Voltage/Current Selection	41	TRQ1: Torque Limit Selection, Bit 1
17	SET3: Set 3rd Motor Data	42	TRQ2: Torque Limit Selection, Bit 2
18	RS: Reset Inverter	43	PPI: Proportional Proportional/Integral Mode Selection
19	Not Used	44	BOK: Brake Confirmation
20	STA: Start (3-Wire Interface)	45	ORT: Orientation (Home Search)
21	STP: Stop (3-Wire Interface)	46	LAC: LAD Cancel
22	F/R: FWD/REV (3-Wire Interface)	47	PCLR: Position Deviation Reset
23	PID: PID Disable	48	STAT: Pulse Train Position Command Input Enable
24	PIDC: PID Reset	—	—
25	Not Used	255	NO: No Assignment to Terminal

Intelligent Output Setting Codes

Intelligent Output Terminal Setting Codes			
Code	**Description**	**Code**	**Description**
00	RUN: Run Signal	14	Not Used
01	FA1: Frequency Arrival Type 1 – constant speed	15	Not Used
02	FA2: Frequency Arrival Type 2 – over-frequency	16	Not Used
03	OL: Overload Advance Notice Signal (1)	17	Not Used
04	OD: Output Deviation for PID Control	18	Not Used
05	AL: Alarm Signal	19	BRK: Brake Release Signal
06	FA3: Frequency Arrival type 3 – at frequency	20	BER: Brake Error Signal
07	OTQ: Over-torque Signal	21	ZS: Zero Speed Detect Signal
08	IP: Instantaneous Power Failure Signal	22	DSE: Speed Deviation Maximum
09	UV: Under-voltage Signal	23	POK: Positioning Completion
10	TRQ: In Torque Limit	24	FA4: Frequency Arrival type 4 – over- frequency (2)
11	RNT: Operation Time Over	25	FA5: Frequency Arrival Type 5 – at frequency (2)
12	ONT: Plug-in Time Over	26	OL2: Overload Advance Notice Signal (2)
13	THM: Thermal Alarm Signal	—	—

SJ300 and L300P Building Network Register Maps

Metasys N2 Point Map

This section is for interfacing the SC-OPE 3H to a Johnson Metasys N2 building network, commonly used in HVAC applications. The following table contains the Network Point Type (NPT), Network Point Address (NPA), Engineering Units (Units), Point Description, Range/Value, and Notes for each point supported in version 1.06 of the SC-OPE 3 for the Hitachi SJ300/L300P series inverters.

NPT	NPA	Units	Point Description	Range/Value	Adjust/ Override
AI	1	Hz	Current Frequency (D001)	0 — 400	✘
AI	2	Hz	Preset Frequency (F001)	0 — 400	✘
AI	3	A	Output Current Monitor (D002)	0 — 6553.5	✘
AI	4	%	PID Feedback Monitor (D004)	0 — 99999.99	✘
AI	5	—	Frequency Conversion Monitor (D007)	0 — 99999.99	✘
AI	6	%	Torque Monitor (D012) (SJ300 only)	–300 — +300	✘
AI	7	V	Output Voltage Monitor (D013)	0 — 6553.5	✘
AI	8	kW	Input Power Monitor (D014)	0 — 6553.5	✘
BI	1	—	Inverter Offline	0=Online 1=Offline	✘
BI	2	—	Stop Flag	0=Off 1=Stopped	✘
BI	3	—	Run Flag	0=Off 1=Running	✘
BI	4	—	Tripping Flag	0=Off 1=Tripped	✘
BI	5	—	Acceleration Flag	0=Off 1=Accelerating	✘
BI	6	—	Deceleration Flag	0=Off 1=Decelerating	✘
BI	7	—	Constant Speed Flag	0=Off 1=Constant Speed	✘
BI	8	—	Forward Flag	0=Off 1=Forward	✘
BI	9	—	Reverse Flag	0=Off 1= Reverse	✘
BI	10	—	Input Terminal 1	0=Open 1=Closed	✘
BI	11	—	Input Terminal 2	0=Open 1=Closed	✘

NPT	NPA	Units	Point Description	Range/Value	Adjust/ Override
BI	12	—	Input Terminal 3	0=Open 1=Closed	✘
BI	13	—	Input Terminal 4	0=Open 1=Closed	✘
BI	14	—	Input Terminal 5	0=Open 1=Closed	✘
BI	15	—	Input Terminal 6 (SJ300 only)	0=Open 1=Closed	✘
BI	16	—	Input Terminal 7 (SJ300 only)	0=Open 1=Closed	✘
BI	17	—	Input Terminal 8 (SJ300 only)	0=Open 1=Closed	✘
BI	18	—	Output Terminal 1	0=Open 1=Closed	✘
BI	19	—	Output Terminal 2	0=Open 1=Closed	✘
BI	20	—	Output Terminal 3 (SJ300 only)	0=Open 1=Closed	✘
BI	21	—	Output Terminal 4 (SJ300 only)	0=Open 1=Closed	✘
BI	22	—	Output Terminal 5 (SJ300 only)	0=Open 1=Closed	✘
AO	1	Hz	Frequency Setting (A020/A220/A320)	0.00 — 400.00	✔
AO	2	Sec	Acceleration Time Setting (F002/F202/ F302)	0.00 — 3000.00	✔
AO	3	Sec	Deceleration Time Setting (F003/F203/ F303)	0.00 — 3000.00	✔
BO	1	—	Forward Run Command	0=No Action, 1=Run Forward	✔
BO	2	—	Reverse Run Command	0=No Action, 1=Run Reverse	✔
BO	3	—	Stop/Reset Command	0=No Action, 1=Stop/Reset	✔
ADF	1	Hz	1st Multi-speed 0 (A020)	0.00 — 400.00	✔
ADF	2	Hz	2nd Multi-speed 0 (A220)	0.00 — 400.00	✔
ADF	3	Hz	3rd Multi-speed 0 (A320) (SJ300 only)	0.00 — 400.00	✔
ADF	4	Hz	Multi-speed 1 (A021)	0.00 — 400.00	✔
ADF	5	Hz	Multi-speed 2 (A022)	0.00 — 400.00	✔
ADF	6	Hz	Multi-speed 3 (A023)	0.00 — 400.00	✔

NPT	NPA	Units	Point Description	Range/Value	Adjust/ Override
ADF	7	Hz	Multi-speed 4 (A024)	0.00 — 400.00	✔
ADF	8	Hz	Multi-speed 5 (A025)	0.00 — 400.00	✔
ADF	9	Hz	Multi-speed 6 (A026)	0.00 — 400.00	✔
ADF	10	Hz	Multi-speed 7 (A027)	0.00 — 400.00	✔
ADF	11	Hz	Multi-speed 8 (A028)	0.00 — 400.00	✔
ADF	12	Hz	Multi-speed 9 (A029)	0.00 — 400.00	✔
ADF	13	Hz	Multi-speed 10 (A030)	0.00 — 400.00	✔
ADF	14	Hz	Multi-speed 11 (A031)	0.00 — 400.00	✔
ADF	15	Hz	Multi-speed 12 (A032)	0.00 — 400.00	✔
ADF	16	Hz	Multi-speed 13 (A033)	0.00 — 400.00	✔
ADF	17	Hz	Multi-speed 14 (A034)	0.00 — 400.00	✔
ADF	18	Hz	Multi-speed 15 (A035)	0.00 — 400.00	✔
ADF	19	Sec	1st Acceleration Time (F002)	0.01 — 3600.00	✔
ADF	20	Sec	2nd Acceleration Time (F202)	0.01 — 3600.00	✔
ADF	21	Sec	3rd Acceleration Time (F302) (SJ300 only)	0.01 — 3600.00	✔
ADF	22	Sec	1st Deceleration Time (F003)	0.01 — 3600.00	✔
ADF	23	Sec	2nd Deceleration Time (F203)	0.01 — 3600.00	✔
ADF	24	Sec	3rd Deceleration Time (F303) (SJ300 only)	0.01 — 3600.00	✔
ADF	25	—	PID - P Gain (A072)	0.2 — 5.0	✔
ADF	26	Sec	PID - I Gain (A073)	0.0 — 3600.0	✔
ADF	27	Sec	PID - D Gain (A074)	0.00 — 100.00	✔
ADF	28	—	PID - Scale (A075)	0.01 — 99.99	✔
ADF	29	Hz	Orientation Speed (P015) (SJ300 only)	0.50 — 60.00	✔
ADF	30	Sec	Orientation Completion Delay Time (P018) (SJ300 only)	0.00 — 9.99	✔
ADF	31	Hr	Accumulated Run Time (D016)	0.0 — 999999.9	✘
ADF	32	Hr	Accumulate On Time (D017)	0.0 — 999999.9	✘
ADF	33	Hz	Terminal Set Frequency	0.00 — 99999.99	✘
ADF	34	V	P-N (DC Bus) Voltage	0.0 — 6553.5	✘
ADF	35	V	Input Voltage	0.0 — 6553.5	✘
ADF	36	Hz	Trip 1 Frequency (D081)	0.00 — 99999.99	✘

NPT	NPA	Units	Point Description	Range/Value	Adjust/ Override
ADF	37	A	Trip 1 Output Current (D081)	0.00 — 655.35	✘
ADF	38	V	Trip 1 P-N Voltage (D081)	0.0 — 6553.5	✘
ADF	39	Hr	Trip 1 Run Time (D081)	0.0 — 999999.9	✘
ADF	40	Hr	Trip 1 Power On Time (D081)	0.0 — 999999.9	✘
ADF	41	Hz	Trip 2 Frequency (D082)	0.00 — 99999.99	✘
ADF	42	A	Trip 2 Output Current (D082)	0.00 — 655.35	✘
ADF	43	V	Trip 2 P-N Voltage (D082)	0.0 — 6553.5	✘
ADF	44	Hr	Trip 2 Run Time (D082)	0.0 — 999999.9	✘
ADF	45	Hr	Trip 2 Power On Time (D082)	0.0 — 999999.9	✘
ADF	46	Hz	Trip 3 Frequency (D083)	0.00 — 99999.99	✘
ADF	47	A	Trip 3 Output Current (D083)	0.00 — 655.35	✘
ADF	48	V	Trip 3 P-N Voltage (D083)	0.0 — 6553.5	✘
ADF	49	Hr	Trip 3 Run Time (D083)	0.0 — 999999.9	✘
ADF	50	Hr	Trip 3 Power On Time (D083)	0.0 — 999999.9	✘
ADF	51	Hz	Trip 4 Frequency (D084)	0.00 — 99999.99	✘
ADF	52	A	Trip 4 Output Current (D084)	0.00 — 655.35	✘
ADF	53	V	Trip 4 P-N Voltage (D084)	0.0 — 6553.5	✘
ADF	54	Hr	Trip 4 Run Time (D084)	0.0 — 999999.9	✘
ADF	55	Hr	Trip 4 Power On Time (D084)	0.0 — 999999.9	✘
ADF	56	Hz	Trip 5 Frequency (D085)	0.00 — 99999.99	✘
ADF	57	A	Trip 5 Output Current (D085)	0.00 — 655.35	✘
ADF	58	V	Trip 5 P-N Voltage (D085)	0.0 — 6553.5	✘
ADF	59	Hr	Trip 5 Run Time (D085)	0.0 — 999999.9	✘
ADF	60	Hr	Trip 5 Power On Time (D085)	0.0 — 999999.9	✘
ADF	61	Hz	Trip 6 Frequency (D086)	0.00 — 99999.99	✘
ADF	62	A	Trip 6 Output Current (D086)	0.00 — 655.35	✘
ADF	63	V	Trip 6 P-N Voltage (D086)	0.0 — 6553.5	✘
ADF	64	Hr	Trip 6 Run Time (D086)	0.0 — 999999.9	✘
ADF	65	Hr	Trip 6 Power On Time (D086)	0.0 — 999999.9	✘
ADI	1	Pulse	Orientation Stop Position (P014) (SJ300 only)	0 — 4095	✔
ADI	2	—	Orientation Direction (P016) (SJ300 only)	0:Forward 1:Reverse	✔

NPT	NPA	Units	Point Description	Range/Value	Adjust/ Override
ADI	3	Pulse	Orientation Completion Range (P017) (SJ300 only)	0 — 10000	✔
ADI	4	—	Electronic Gear Numerator (P020) (SJ300 only)	1 — 9999	✔
ADI	5	—	Electronic Gear Denominator (P021) (SJ300 only)	1 — 9999	✔
ADI	6	—	AT Terminal Selection (A005)	0:Changing O and OI 1:Changing O and O2	✔
ADI	7	—	PID Selection (A071)	0:Off 1:On	✔
ADI	8	—	PID Feedback Selection (A076)	0:From OI 1:From O	✔
ADI	9	—	Operation Direction Monitor (D003)	0:Stopped 1:Forward 2:Reverse	✘
ADI	10	—	Trip Counter (D080)	0 — 65535	✘
ADI	11	—	Factor/Status of Trip 1 (D081)	0 — 255	✘
ADI	12	—	Factor/Status of Trip 2 (D082)	0 — 255	✘
ADI	13	—	Factor/Status of Trip 3 (D083)	0 — 255	✘
ADI	14	—	Factor/Status of Trip 4 (D084)	0 — 255	✘
ADI	15	—	Factor/Status of Trip 5 (D085)	0 — 255	✘
ADI	16	—	Factor/Status of Trip 6 (D086)	0 — 255	✘

SJ100 / L100 Network Register Maps

E

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SJ100 and L100 Factory Network Register Maps

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ100/ L100 #Reg. #	SJ100 / L100 Parameter	Range / Value	Units	Notes
40001	V2000	N7:0	Read	N/A	Network Control Flag	0=Keypad Control 1=Network Control	Numeric Code	Used Only by SC-OPE (Not Sent to Inverter)
40002	V2001	N7:1	R/W	N/A	Watchdog Timeout Value	0=Disabled, or 100 — 30000	ms	Used Only by SC-OPE (Not Sent to Inverter)
40003	V2002	N7:2	R/W	N/A	Watchdog Timeout Action (only applicable when control is from network and motor is running)	0 = Stop Motor 1 = Stop Motor And Disable Network Control 2 = Continue Running	Numeric Code	Used Only by SC-OPE (Not Sent to Inverter)
40004	V2003	N7:3	Write	N/A	Store to EEPROM (stores any changed drive parameters into drive's EEPROM)	0 = Do Nothing 1 = Store to EEPROM	Numeric Code	Will prevent monitor data from being updated for 5 seconds
40005	V2004	N7:4	Write	—	Run Command	0=Stop 1=Run Forward 2=Run Reverse	Numeric Code	Valid Regardless of Motor Selected (1st, 2nd)
40006	V2005	N7:5	R/W	—	Preset Frequency	0 — 40000	.01 Hz	Valid Regardless of Motor Selected (1st, 2nd)
40007	V2006	N7:6	R/W	—	Acceleration Time	1 — 36000	.1 s	Valid Regardless of Motor Selected (1st, 2nd)
40008	V2007	N7:7	R/W	—	Deceleration Time	1 — 36000	.1 s	Valid Regardless of Motor Selected (1st, 2nd)

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ100/ L100 #Reg. #	SJ100 / L100 Parameter	Range / Value	Units	Notes
40009	V2010	N7:8	Read	—	Run Status	Bits 1-0: State 0x01=Stopped 0x02=Decelerating 0x03=Constant Speed 0x04=Accelerating Bit 4-2: Not Used Bit 5: Inverter Comm Error 0=OK, 1= No Comm Bit 6: Trip Flag 0=No Trip, 1=Tripped Bit 7: Run Flag 0=Stopped, 1=Running	Bit Flag	
40010	V2011	N7:9	Read	D001	Output Frequency	0 — 40000	.01 Hz	
40011	V2012	N7:10	Read	D002	Output Current	0 — 65535	.1 A	
40012	V2013	N7:11	Read	D003	Direction of Output	0=Stopped 1=Forward 2=Reverse	Numeric Code	
40013	V2014	N7:12	Read	D004	PID Feedback	0 — 65535	%	
40014	V2015	N7:13	Read	D005	Intelligent Input Status	Bit 0: Input Terminal 1 Bit 1: Input Terminal 2 Bit 2: Input Terminal 3 Bit 3: Input Terminal 4 Bit 4: Input Terminal 5 Bit 5: Input Terminal 6 Bit 6: Input Terminal 7 Bit 7: Input Terminal 8 Bit 8: Input Terminal FW	Bit Flag 0=Off, 1=On	
40015	V2016	N7:14	Read	D006	Intelligent Output Status	Bit 0: Output Terminal 11 Bit 1: Output Terminal 12 Bit 2: Output Terminal 13 Bit 3: Output Terminal 14 Bit 4: Output Terminal 15 Bit 5: Output Terminal AL	Bit Flag 0=Off, 1=On	
40016	V2017	N7:15	Read	D007	Frequency Conversion Monitor	0 — 65535	.01 units	
40017	V2020	N7:16	Read	D014	Input Power	0 — 65535	.1 kW	
40018	V2021	N7:17	Read	—	Input voltage	0 — 65535	.1 V	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ100/ L100 #Reg. #	SJ100 / L100 Parameter	Range / Value	Units	Notes
40019	V2022	N7:18	Read	—	P-N Voltage	0 — 65535	.1 V	
40020	V2023	N7:19	Read	—	Terminal Set Frequency	0 — 65535	.01 Hz	
40021	V2024	N7:20	Read	D080	Number of Trips	0 — 65535	Count	
40022	V2025	N7:21	Read	D081	Trip 1 Factor (Most Recent)	0 — 79	Error Number	
40023	V2026	N7:22	Read	D081	Trip 1 Frequency	0 — 65535	.01 Hz	
40024	V2027	N7:23	Read	D081	Trip 1 Output Current	0 — 65535	.01 A	
40025	V2030	N7:24	Read	D081	Trip 1 P-N Voltage	0 — 65535	.1 V	
40026	V2031	N7:25	Read	D081	Trip 1 Time	0 — 65535	Days	
40027	V2032	N7:26	Read	D082	Trip 2 Factor	0 — 79	Error Number	
40028	V2033	N7:27	Read	D082	Trip 2 Frequency	0 — 65535	.01 Hz	
40029	V2034	N7:28	Read	D082	Trip 2 Output Current	0 — 65535	.01 A	
40030	V2035	N7:29	Read	D082	Trip 2 P-N Voltage	0 — 65535	.1 V	
40031	V2036	N7:30	Read	D082	Trip 2 Time	0 — 65535	Days	
40032	V2037	N7:31	Read	D083	Trip 3 Factor	0 — 79	Error Number	
40033	V2040	N7:32	Read	D083	Trip 3 Frequency	0 — 65535	.01 Hz	
40034	V2041	N7:33	Read	D083	Trip 3 Output Current	0 — 65535	.01 A	
40035	V2042	N7:34	Read	D083	Trip 3 P-N Voltage	0 — 65535	.1 V	
40036	V2043	N7:35	Read	D083	Trip 3 Time	0 — 65535	Days	
40037	V2044	N7:36	R/W	F002	Acceleration time	0 — 36000	.1 s	
40038	V2045	N7:37	R/W	F202	2nd Acceleration time	0 — 36000	.1 s	(SJ100 Only)
40039	V2046	N7:38	R/W	F003	Deceleration time	0 — 36000	.1 s	
40040	V2047	N7:39	R/W	F203	2nd Deceleration time	0 — 36000	.1 s	(SJ100 Only)
40041	V2050	N7:40	R/W	A020	Multi-Speed 0	0 — 40000	.01 Hz	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ100/ L100 #Reg. #	SJ100 / L100 Parameter	Range / Value	Units	Notes
40042	V2051	N7:41	R/W	A220	2nd Multi-Speed 0	0 — 40000	.01 Hz	(SJ100 Only)
40043	V2052	N7:42	R/W	A021	Multi-Speed 1	0 — 40000	.01 Hz	
40044	V2053	N7:43	R/W	A022	Multi-Speed 2	0 — 40000	.01 Hz	
40045	V2054	N7:44	R/W	A023	Multi-Speed 3	0 — 40000	.01 Hz	
40046	V2055	N7:45	R/W	A024	Multi-Speed 4	0 — 40000	.01 Hz	
40047	V2056	N7:46	R/W	A025	Multi-Speed 5	0 — 40000	.01 Hz	
40048	V2057	N7:47	R/W	A026	Multi-Speed 6	0 — 40000	.01 Hz	
40049	V2060	N7:48	R/W	A027	Multi-Speed 7	0 — 40000	.01 Hz	
40050	V2061	N7:49	R/W	A028	Multi-Speed 8	0 — 40000	.01 Hz	
40051	V2062	N7:50	R/W	A029	Multi-Speed 9	0 — 40000	.01 Hz	
40052	V2063	N7:51	R/W	A030	Multi-Speed 10	0 — 40000	.01 Hz	
40053	V2064	N7:52	R/W	A031	Multi-Speed 11	0 — 40000	.01 Hz	
40054	V2065	N7:53	R/W	A032	Multi-Speed 12	0 — 40000	.01 Hz	
40055	V2066	N7:54	R/W	A033	Multi-Speed 13	0 — 40000	.01 Hz	
40056	V2067	N7:55	R/W	A034	Multi-Speed 14	0 — 40000	.01 Hz	
40057	V2070	N7:56	R/W	A035	Multi-Speed 15	0 — 40000	.01 Hz	
40058	V2071	N7:57	R/W	A071	PID selection	0=Invalid, 1=Valid	Code	
40059	V2072	N7:58	R/W	A072	PID-P gain	2 — 50	.1 units	
40060	V2073	N7:59	R/W	A073	PID-I gain	0 — 36000	.1 s	
40061	V2074	N7:60	R/W	A074	PID-D gain	0 — 10000	.01 s	
40062	V2075	N7:61	R/W	A075	PID scale	1 — 9999	.01 units	
40063	V2076	N7:62	R/W	A076	PID feedback selection	0=Feedback OI, 1=Feedback O	Code	
40064	V2077	N7:63	R/W	A038	Jogging Frequency	0 — 999	.01 Hz	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ100/ L100 #Reg. #	SJ100 / L100 Parameter	Range / Value	Units	Notes
40065	V2100	N7:64	R/W	A039	Jogging selection	0=Free run/invalid on run 1=Stop decel/invalid on run 2=DC brake/invalid on run 3=Free run/valid on run 4=Stop decel/valid on run 5=DC brake/valid on run	Code	
40066	V2101	N7:65	R/W	A092	Acceleration time2	0 — 36000	.1 s	
40067	V2102	N7:66	R/W	A292	2nd Acceleration time2	0 — 36000	.1 s	(SJ100 Only)
40068	V2103	N7:67	R/W	A095	Acceleration Switch Frequency	0 — 40000	.01 Hz	
40069	V2104	N7:68	R/W	A295	2nd Acceleration Switch Frequency	0 — 40000	.01 Hz	(SJ100 Only)
40070	V2105	N7:69	R/W	A097	Acceleration pattern selection	0=Straight Line 1=S-Curve 2=U-Curve 3=Reverse U-Curve	Code	
40071	V2106	N7:70	R/W	A093	Deceleration time 2	0 — 36000	.1 s	
40072	V2107	N7:71	R/W	A293	2nd Deceleration time2	0 — 36000	.1 s	(SJ100 Only)
40073	V2110	N7:72	R/W	A096	Deceleration Switch Frequency	0 — 40000	.01 Hz	
40074	V2111	N7:73	R/W	A296	2nd Deceleration Switch frequency	0 — 40000	.01 Hz	(SJ100 Only)
40075	V2112	N7:74	R/W	A098	Deceleration pattern selection	0=Straight Line 1=S-Curve 2=U-Curve 3=Reverse U-Curve	Code	
40076	V2113	N7:75	R/W	A001	Frequency setting selection	0=VR 1=Terminal 2=Operator	Code	
40077	V2114	N7:76	R/W	A002	Operation setting selection	1=Terminal 2=Operator	Code	
40078	V2115	N7:77	R/W	A003	Base frequency setting	50 — 360	Hz	
40079	V2116	N7:78	R/W	A203	2nd Base frequency	50 — 360	Hz	(SJ100 Only)
40080	V2117	N7:79	R/W	A004	Maximum Frequency	50 — 360	Hz	
40081	V2120	N7:80	R/W	A204	2nd Maximum frequency	50 — 360	Hz	(SJ100 Only)

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ100/ L100 #Reg. #	SJ100 / L100 Parameter	Range / Value	Units	Notes
40082	V2121	N7:81	R/W	A082	Motor voltage selection	0=200,1=215,2=220,3=230,4=240,5=380,6=400,7=415,8=440,9=460,10=480,11=575,12=600	Code	
40083	V2122	N7:82	R/W	B083	Carrier frequency setting	5 — 120	.1 Hz	
40084	V2123	N7:83	R/W	C001	Intelligent input 1 setting	See table on page E–9	Code	
40085	V2124	N7:84	R/W	C002	Intelligent input 2 setting	See table on page E–9	Code	
40086	V2125	N7:85	R/W	C003	Intelligent input 3 setting	See table on page E–9	Code	
40087	V2126	N7:86	R/W	C004	Intelligent input 4 setting	See table on page E–9	Code	
40088	V2127	N7:87	R/W	C005	Intelligent input 5 setting	See table on page E–9	Code	
40089	V2130	N7:88	R/W	C006	Intelligent input 6 setting	See table on page E–9	Code	(SJ100 Only)
40090	V2131	N7:89	R/W	C011	Intelligent input 1 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	Code	
40091	V2132	N7:90	R/W	C012	Intelligent input 2 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	Code	
40092	V2133	N7:91	R/W	C013	Intelligent input 3 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	Code	
40093	V2134	N7:92	R/W	C014	Intelligent input 4 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	Code	
40094	V2135	N7:93	R/W	C015	Intelligent input 5 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	Code	
40095	V2136	N7:94	R/W	C016	Intelligent input 6 a/b (NO/NC) selection	0=Normally Open 1=Normally Closed	Code	(SJ100 Only)
40096	V2137	N7:95	R/W	C021	Intelligent output 11 setting	See table on page E–9	Code	
40097	V2140	N7:96	R/W	C022	Intelligent output 12 setting	See table on page E–9	Code	
40098	V2141	N7:97	R/W	C023	Alarm relay output	See table on page E–9	Code	
40099	V2142	N7:98	R/W	C031	Intelligent output 11 a/b	0=Normally Open 1=Normally Closed	Code	

Modbus Reg. #	Direct-Net Reg. #	DF1 Reg. #	Access Type	SJ100/ L100 #Reg. #	SJ100 / L100 Parameter	Range / Value	Units	Notes
40100	V2143	N7:99	R/W	C032	Intelligent output 12 a/b	0=Normally Open 1=Normally Closed	Code	
40101	V2144	N7:100	R/W	C033	Alarm relay output a/b	0=Normally Open 1=Normally Closed	Code	
40102	V2145	N7:101	R/W	A061	Frequency upper limiter	0 — 40000	.01 Hz	
40103	V2146	N7:102	R/W	A062	Frequency lower limiter	0 — 40000	.01 Hz	
40104	V2147	N7:103	R/W	A063	Jump frequency1	0 — 40000	.01 Hz	
40105	V2150	N7:104	R/W	A064	Jump frequency Width 1	0 — 1000	.01 Hz	
40106	V2151	N7:105	R/W	A065	Jump frequency 2	0 — 40000	.01 Hz	
40107	V2152	N7:106	R/W	A066	Jump frequency width 2	0 — 1000	.01 Hz	
40108	V2153	N7:107	R/W	A067	Jump frequency 3	0 — 40000	.01 Hz	
40109	V2154	N7:108	R/W	A068	Jump frequency width 3	0 — 1000	.01 Hz	
40110	V2155	N7:109	R/W	A041	Torque boost selection	0=Manual, 1=Automatic	Code	
40111	V2156	N7:110	R/W	A241	2nd Torque boost selection	0=Manual, 1=Automatic	Code	(SJ100 Only)
40112	V2157	N7:111	R/W	A042	Manual torque boost	0 — 200	.1 %	
40113	V2160	N7:112	R/W	A242	2nd Manual torque boost	0 — 200	.1 %	(SJ100 Only)
40114	V2161	N7:113	R/W	A043	Manual torque boost point	0 — 500	.1 %	
40115	V2162	N7:114	R/W	A243	2nd Manual torque boost point	0 — 500	.1 %	(SJ100 Only)
40116	V2163	N7:115	R/W	A044	1st control	0=VC, 1=VP,2=Free V/F, 3=SLV, 4=0Hz-SLV,5=V2	Code	
40117	V2164	N7:116	R/W	A244	2nd control	0=VC, 1=VP,2=Free V/F, 3=SLV, 4=0Hz-SLV	Code	(SJ100 Only)
40118	V2165	N7:117	R/W	A045	Output voltage gain	20 — 100	%	

Intelligent Terminal Codes

Intelligent Input Setting Codes

Intelligent Input Terminal Setting Codes			
Code	**Description**	**Code**	**Description**
00	FW: Forward Run/Stop	15	SFT: Software Lock
01	RV: Reverse Run/Stop	16	AT: Analog Input Voltage/Current Select
02	CF1: Multi-speed select, Bit 0	17	Not used
03	CF2: Multi-speed select, Bit 1	18	RS: Reset Inverter
04	CF3: Multi-speed select, Bit 2	19	PTC Themistor thermal Protection
05	CF4: Multi-speed select, Bit 3	20	Not Used
06	JG: Jogging	21	Not Used
07	DB: External DC Braking	22	Not Used
08	SET: Set 2nd Motor	23	Not Used
09	2CH: 2-Stage Accel and Decel	24	Not Used
10	Not Used	25	Not Used
11	FRS: Free-run Stop	26	Not Used
12	EXT: External Trip	27	UP: Remote Control UP Function
13	USP: Unattended Start Protection	28	DWN: Remote Control DOWN Function
14	CS: Commercial Change	29	Not Used

Intelligent Output Setting Codes

Intelligent Output Terminal Setting Codes			
Code	**Description**	**Code**	**Description**
00	RUN: Run Signal	03	OL: Overload Advance Notice Signal
01	FA1: Frequency Arrival Type 1 Signal	04	OD: Output Deviation for PID Control
02	FA2: Frequency Arrival Type 2 Signal	05	AL: Alarm Signal

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